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# Dental fear | a naturalistic application of reattribution principles

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# DENTAL FEAR:
# A NATURALISTIC APPLICATION OF
# REATTRIBUTION PRINCIPLES

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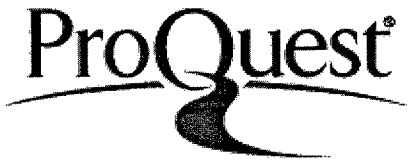

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The present study attempted to assess the effects of reattribution of arousal in the natural settings of three dental offices. Adult dental patients received an injection of a local anesthetic during regular treatment and were assigned to one of three verbal information conditions: 1) Drug-informed 2) Normality or 3) Control. The subjects of the Drug-informed condition were informed that the injection typically produces physiological arousal symptoms. The Normality patients were informed as to the typical symptoms felt in the dental situation with no causal factor named. Control groups received no experimental information. Patients' subsequent self-reports of level of arousal and causal attributions for the arousal were examined. Results revealed that, as predicted, Drug-informed subjects reattributed part of their arousal to the drug and reduced their attributions of arousal to fear. Normality subjects did not reattribute their arousal but did reduce the perceived arousal level. Both experimental manipulations were discussed as useful innovations for current dental practices.

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# CHAPTER 1

## INTRODUCTION

The general orientation of attribution theory is to recognize rules by which an individual attempts to infer causes of the behavior which he/she observes. Attribution theory originated from the study of person perception and developed out of a variety of convergent lines of inquiry in social psychology. A dominant influence on contemporary work in the area of person perception has been the writings of Fritz Heider (1958). As a Gestalt psychologist, Heider made a major theoretical contribution toward our understanding of the principles of social perception upon introducing his "attribution theory"--a conceptualization of how individuals understand and predict the behavior of other persons.

According to Heider, we achieve understanding of others by tracing their actions to the relatively stable underlying attributes of the person and the environment in which they operate. Causation for behavior may thus be attributed to either situational or dispositional factors or a combination of these two components.

Two major extensions of Heider's attribution theory were provided by the work of Jones and Davis (1965) and Kelley (1967, 1971). Both extensions attempted to construct a systematic framework of attribution concepts. According to Kelley, a function of the attributional process is to create a sense of control in the perceiver. Thus, attri-

bution can be seen as an attempt to gain effective management of self and environment. Support for Kelley's concept of control is provided by results of studies which show that individuals attribute causality to themselves under conditions of success, while attributing causality to external factors under conditions of failure (Miller, 1976; Sicoly & Ross, 1977; Struefert & Struefert, 1969). Similarly, Cialdini, Braver, and Lewis (1974), in their work regarding interpersonal interaction, also noted that inferences which individuals made about the characteristics of others enhanced their own sense of competence and control.

Kelley also proposed a principle of covariance, which when applied to three specific factors, can suggest whether an attribution for a behavior should be made to a dispositional or situational factor. These three factors considered are the distinctiveness and consistency of a behavior, and a consensus from other persons regarding its occurrence.

The approach to attributional processes taken by Jones and Davis emphasized a concept of "correspondent inference." This theory, like Kelley's, regarded the basis of the attributional process to be that of understanding covariance, although the concentration here was on the effects of behavior. Jones and Davis specified the determinants of attribution as the number of non-common effects and the assumed desirability of effects. These principles have also been supported by research (Jones, Davis, & Gergen, 1961).

The systematic theorizing of these individuals produced an enormous amount of interest and subsequent empirical studies, to the point where attribution is now one of the more heavily researched areas in

social psychology. Numerous spin-offs of the main theory have developed and have been applied in psychological areas. Those most relevant to this present pursuit are discussed in the following pages.

## Self-Perception Theory

As it evolved through the work of Heider, Jones and Davis, and Kelley, attribution theory dealt primarily with the individual's perceptions and inferences regarding the causes of other persons' behaviors. The theoretical basis of understanding our own behavior as individuals was provided, in large part, by Daryl Bem's "Self-perception theory" (1965, 1967, 1972). The common ground between the process of self-attribution and the former theories of attribution to others is easily recognized through Bem's writings. A differentiation between the self-perception concept and previous theories must be noted, however, as a significant aspect of the theory. Bem introduced his theory as an alternative interpretation of cognitive dissonance phenomenon, and as such argued against a motivational interpretation of man's behavior, substituting an information-processing construct of self-attribution.

Bem postulated that we infer the causes of our own behavior in much the same way as we would speculate about the behavior of others. That is, we look at observable behavior and reflect back to the possible reasons for its occurrence. We then attribute beliefs, attitudes, and even internal states to ourselves by infering them from this observation of our own overt behavior and/or the circumstances in which it occurs. In this process we produce explanations for our behavior which may or may not be appropriate, but nevertheless are influencial in deter-

mining our subsequent actions.

Bem stated that often our own internal cues are strong and clear enough to make causal inferences about our behavior, but when information from internal cues is weak, ambiguous, or uninterpretable, the individual must rely on external cues to infer internal states. This is functionally similar to being in the position of an outside observer.

This process was well demonstrated in a study by Bandler, Madaras, and Bem (1968) in which subjects were required to receive a series of shocks to their hand, and could therefore observe themselves escaping or enduring the shock. Unknown to the subjects, all of the shocks were of the same intensity. Subjects' ratings of the shocks supported Bem's self-perception concept: Subjects rated the discomfort produced by the shocks to be greater in the "escape" condition (where subjects saw themselves escaping the shock by pulling their hand away) than in the "endurance" condition (where subjects saw themselves enduring the shock). A record of the subjects' galvanic skin responses showed that actual physiological arousal was not serving as the basis for the differential discomfort ratings, so the authors had support for their conclusion that the observation of their own behavior was responsible for the subjects' perceptions of pain.

Bem's postulate that people partially infer their attitudes from the observation of their own behavior has been further supported in other areas of social research. Foot-in-the-door studies by Beaman, Svanum, Manlove, and Hampton (1974), Freedman and Fraser (1966) and Snyder and Cunningham (1975) along with a demonstration of helping behavior by Uranowitz (1975) illustrated self-perception principles. The

over-justification hypothesis generated by self-perception theory was tested by Lepper, Green, and Nisbett (1973a), through a field experiment performed with children. This hypothesis proposes that to the extent that an individual finds little external reason for his behavior, he will subsequently attribute that behavior to intrinsic motivation. The experimental hypothesis proposed that a person's intrinsic interest in an activity may be undermined by engaging him in the activity for a high external justification. Results of the study supported the predictions of the authors: Children who expected rewards for their participation in an activity showed less subsequent intrinsic interest in the same activity than did children who had not expected a reward. Bem's theory would explain these data by suggesting that the children in the no-reward condition attributed their participation to an internal interest because they had no external justification as an alternative explanation.

In a similar study, Lepper (1973b) decreased cheating behavior and maintained an attribution of honesty in children under conditions of low external justification. In an opposing condition, children given high external justification displayed more cheating behavior, suggesting less attributions of internal honesty on the latter group's part.

Two additional studies, Corah and Boffa (1970) and Klemp and Leventhal (1972), replicated and extended the Bandler, et al. publication (1968). Corah and Boffa illustrated how a cognitive factor (a sense of control) acts as an important mediator in determining the degree to which pain is perceived by subjects. In their study perceived control of the painful stimuli promoted a perception of decreased pain.

An additional point about the nature of the external cues in-

volved in self-perception processes was made by Klemp and Leventhal, using the Bandler, et al. paradigm. Their experiment demonstrated that important individual differences exist in reactions to cognitive cues. More specifically, the predicted self-perception effects only occured with subjects who initially had displayed, and were therefore categorized as possessing, a high degree of tolerance for shock (and low fear). Low tolerance (high fear) subjects, however, did not demonstrate self-perception effects; they rated "escape" shocks as less painful. The authors suggested that low tolerance subjects were highly fearful and therefore likely to be more responsive to the shock as a salient stimulus, since their mental set was to escape the shock as soon as possible. On the other hand, high tolerance subjects, being less concerned with the shock itself, could conceivably attend to their behavior as a salient factor, therein making them more likely to exhibit self-perception effects.

The presence of a high versus low-anxiety differential was also noted by Rickels, Lipman, and Raab (1966) and discussed quite thoroughly by Brehm (1976, p. 162-4). In a study by Conger, Conger, and Brehm (1976), subjects in a snake-aversion relief experiment responded to the misattribution manipulation (false heart-rate feedback) only if they were initially relatively low in fear. Both increased approach behavior toward snakes and lessened emotional feelings as a result of reattribution were evidenced by these low-fear subjects. Brehm maintained that these findings regarding response differences between high and low-fear subjects are consistent with both Schachter's and Bem's basic postulates. A low-fear subject can be considered as being in a relatively ambiguous situation, feeling some arousal with no sharply-defined cause. An

external explanatory cue can easily therefore be accepted into the cognitive framework. At the other extreme, a high-fear individual is not subject to such ambiguity, having labeled the internal arousal as fear. As such this person seeks no additional cues to account for the arousal, and the experimental manipulation is not likely to affect his judgment. In Bem's terms, he would not need to examine his behavior in order to know why the arousal is present.

## Cognition and Emotions

Stanley Schachter's cognitive theory of emotions (1964) and the subsequent body of research related to this theory provide an empirically supported conceptualization of how we, as individuals, perceive our own emotional states. Schachter's theory represents one well-defined aspect of the general attribution theory, and also offers support for other attributional models such as self-perception.

The basic principles of the cognitive theory of emotions were illustrated and supported in Schachter and Singer's classic 1962 experiment. In this study, subjects were exposed to one of two emotion producing situations. In the first, the "euphoria" condition, subjects waited in an experimental room in which a confederate feigned a euphoric state and encouraged the real subject to join in his fun. Prior to being placed in this emotion producing situation, one quarter of the subjects who were to take part were given an injection of epinephrine (adrenalin) and were told to expect autonomic arousal symptoms appropriate to the drug (epinephrine-informed group). Another quarter of the subjects received an injection of epinephrine, but were not informed as

to the effects it would produce (epinephrine-ignorant group), and one additional quarter of the subjects were similarly injected, but told to expect symptoms wholly unrelated to those which would occur (epinephrine-misinformed group). The final one quarter of the subjects were simply injected with a saline solution and received no information about symptoms (placebo group).

In the second condition, the "anger" condition, subjects were asked to fill out an insulting questionnaire, while at the same time a participating experimental confederate expressed outrage at the questions. This anger condition included the same groupings and procedures as in the euphoria condition, with the exception that the epinephrine-misinformed group was not included.

The results of the study indicated that epinephrine-ignorant subjects in both the euphoric and anger conditions displayed significantly greater emotion, appropriate to their condition, than did the epinephrine-informed groups. This significant difference was also maintained between the epinephrine-ignorant and the placebo groups in the anger condition. In the euphoria condition, where an epinephrine-misinformed group was included, the emotion displayed in this group was also significantly greater than the epinephrine-informed group. Interestingly, the informed group was even less emotional than the placebo group, suggesting an over-compensation on their part for the effects of the drug.

According to Schachter and Singer, their experiment illustrated how individuals search for reasons to understand their autonomic arousal, and they therefore suggested that emotions experienced are not simply a

function of the physiological arousal present, but also depend on the person's cognitions about the possible causes for his arousal. Cognitive processes mediate internal and external (environmental) cues, and the end product, an emotional state, is brought about by the interaction of both cognitive and physiological factors.

In both of the experimental conditions above, internal cues were identical, as was the stimulus (the situation). However, subjects differed greatly in their evaluation of this stimulus, due to the cognitive factor involved in their particular condition. Informed-injected groups found an explanation for their arousal in the information they received about the drug, while the other injected groups, not finding an obvious reason for their arousal, responded to the situational cue. As evidenced by the informed-injected group, individuals may even fail to infer that they are being affected by a stimulus, if they are previously informed that their physiological arousal is produced by an extrinsic factor.

Schachter's central theoretical statement was that cognitive and physiological arousal factors interact to bring about the labeling of an emotional state. An internal arousal cue produces an evaluative need (to understand the feeling) which leads to a process of explanation in terms of external cues. The end result is the labeling of an emotional state.

Even more so than just demonstrating Schachter's principles, this experiment suggested to researchers the logic of manipulating an individual's self-attributions regarding emotional states by maneuvering the external cues which are available to him. This idea has been put

into operation by numerous researchers, and the process of reattribution has been quite successfully demonstrated in various settings.

Schachter's original (1962) study created a misattribution effect through manipulation of the apparent source of the subjects' arousal. In a follow-up study (1966), Nisbett and Schachter once again produced a re-evaluation of stimuli through cognitively shifting the perceived cause of arousal. In this study no actual drug was used, in order to demonstrate how natural physiological reactions can influence subjective and behavioral reactions to emotional stimuli.

Prior to the experiment proper, all subjects were given a sugar pill (placebo). One half of the group was told that the pill would produce autonomic symptoms such as palpitations, increased breathing rate, and "butterflies", while the remaining one half was told to expect non-arousal symptoms. All subjects then underwent a series of increasingly intense shocks, and were instructed to indicate the point at which the shocks became intolerable. Results confirmed the expectations of the authors. The group of subjects who were told to expect arousal symptoms reported less pain during the shock series, and tolerated nearly four times the shock amperage tolerated by other subjects. Analysis indicated that the toleration of shock was a direct function of the extent to which subjects ascribed their arousal to the pill. It appeared that subjects lowered their evaluation of the intensity of the shock, which actually did produce the arousal, due to the cognition that the arousal was produced by the pill. In discussing their results, Nisbett and Schachter did note the difficulty of applying the misattribution manipulation when the stimulus (shock) was most salient and subjects were

highly aroused. Consistent with the Brehm discussion, the authors interpreted their results as indicating that high arousal precludes the use of misattribution to reduce fear.

Other studies have also demonstrated that subjects can be persuaded to misattribute stimulus-produced arousal to an irrelevant external source, and that often the intensity of an emotional experience will diminish for an individual if this arousal is attributed to a nonemotional source. Ross, Rodin, and Zimbardo (1969) produced both a decrease in fear of anticipated shock and a difference in shock-avoidance behavior due to fear reduction, by providing white noise as a misattribution stimulus.

Dienstbier and Munter (1971) produced in the laboratory a naturally induced emotion (fear and/or guilt arousal in a cheating situation) and used misattribution principles to create a nonspecific arousal in a placebo group. Subjects who were told to expect arousal from a pill cheated more than subjects expecting mild side-effects. The authors reasoned that individuals misattributing their natural arousal to the pill no longer felt the inhibition which guilt or fear usually produce.

A study by London and Monello (1974) went a step further in broadening the notion of what cues may affect the cognitive labeling of emotions. Subjects performing a task were misled as to how rapidly or slowly the time passed. The differences in this internal cue (the feeling of time passing) resulted in differences between conditions in reported emotional states. Subjects who were cued that time passed quickly later rated the task as more interesting than did the slow-time group.

Autonomic Activity as a Source of Cognitive Information

The previously cited research has demonstrated how reattribution can be produced by manipulation of an apparent source of arousal. The reattribution process can also be put into operation by manipulating the apparent degree of arousal. In this type of paradigm, an externally-supplied indication of physiological arousal is the standard tool by which reattribution effects are achieved. The following studies provide illustrations of this principle.

Berkowitz and Turner (1974) supplied subjects with feedback from an "anger-meter" after they had been exposed to an experimental situation in which they were either provoked by an experimental confederate or approached on a neutral basis. The subjects were led to believe that the meter could correctly identify their level of anger by means of the physiological apparatus which was attached to their bodies. After receiving high or low anger feedback, subjects were required to give shocks to the provoker or neutral target. A significant relationship was noted between the level of anger feedback and the shocks which were subsequently delivered in the "provoker" situation. Subjects responded to the information supplied them regarding their internal state of anger by behaving in a way appropriate to their level of "anger."

In a 1966 study, Valins cleverly demonstrated the misattribution effect produced by cues not derived from actual internal states. Male subjects were shown pictures of "Playboy" nudes while listening to feedback of their own supposed heart rate, which was actually a controlled tape of heart-like sounds. During the presentation of some random pictures, subjects heard their "heartbeat" change to a rapid

frequency, while the rest of the pictures (controls) produced a return to a relatively stable heartrate. Later, the pictures seen in the presence of rapid heartbeat feedback were rated by the subjects as more attractive than the control pictures.

A follow-up to this study (Valins, 1972) employed the same paradigm, but carried the study a step further by informing subjects during debriefing as to the false nature of the heartbeat feedback. Even so, on later re-ratings of the same nudes, debriefed subjects still held to their earlier ratings of prefered nudes. According to Valins, the surprising tenacity of the misattribution effect which was illustrated by his work suggested that subjects cognitively accept the experimentally supplied misinformation. In line with this thinking, Valins postulated a "self-persuasion" hypothesis. He suggested that subjects in a reattribution situation do not engage in a simple passive acceptance of the new cognitive input, but rather conduct an active hypothesis-testing strategy. Subjects must prove to themselves that they have appropriately managed their cognitive cues. If their immediate experience justifies the new cognition, reattribution will occur.

In the case of his own study, Valins maintained that subjects hearing the rapid heartrate feedback generated a hypothesis that the nude was particularly attractive. It was easy for them to subsequently confirm this hypothesis by visually searching the pictures for the exceptional features which caused such increased heartrate. A similarity to self-perception theory can be recognized here.

Valins also maintained that due to the cognitive effort involved in this self-persuasion process, the attitude produced by it will be

difficult to change. Also, the self-persuasion concept can feasibly explain the research results which have not produced the reattribution effects intended. Subjects who cannot satisfactorily confirm their hypotheses through immediate experience will not reattribute causation. There is also a possibility that behavior or an attitude may change in a given direction momentarily, but given no cognitive confirmation, will quickly return to its prior state. An implication for further reattribution attempts, then, is to provide the subjects with an adequate opportunity for self-persuasion to occur, in order to optimize the maintenance of the effects.

Barefoot and Straub (1971) provided support for Valins' proposal that the process of hypothesis testing needs time in order to solidify effects. Employing Valins' paradigm, subjects were given either long or short exposure times to view the pictures. Appropriately controlled findings showed that long-exposure subjects, who had more time for a visual search, responded to the misattribution process more so than did short-exposure subjects. Koenig and Henrikson (1974), to be discussed more fully later in this chapter, also replicated Valins' data. These researchers similarly manipulated degree of arousal to produce the reattribution phenomenon.

The role of physiological arousal as a determinant of emotion was examined in a two-part study by Goldstein, Fink, and Mettee (1972). In the initial phase of the study, the Valins false heartrate procedure was replicated, along with which a measure of each subject's actual heartrate was taken. The expected Valins effect occurred, however it was noted that the relationship between the subjects' reports of

emotionality and their true heartrate was not particularly strong. The authors concluded that actual physiological arousal was not a strong mediator in subsequent self-reports of emotionality in this situation.

In the second part of the study, the experimenters varied the situation by manipulating the level of emotion. They found that only in the "high-emotionality" condition did a significant relationship occur between actual heartrate and reported emotionality. The authors therefore reasoned that in a low-emotion situation, which they feel is represented by the Valins paradigm, an individual may rationally evaluate cognitive information to reach a conclusion about his emotionality, and in this process a "mimic effect" (the actual deviation of the heartrate from baseline due to the heard heartrate) may occur, but its effect on reported emotionality will be minimal. On the other hand, the authors state, in highly emotional situations neither a Valins effect nor a mimic effect is observed, but rather a direct link between actual heartrate and emotionality is established. Cognitive cues are, in effect, overridden in determining one's emotional state by the strong physiological indicators present.

A very recent study by Kerber and Coles (1978) replicated and also extended the "Valins effect." This paradigm included conditions designed to again assess the role of actual physiological state in affective ratings and also to determine the process by which the Valins effect occurs. Results indicated that actual physiological reactions played a minor role in affective ratings in this study. Also, in line with Valins' self-persuasion hypothesis, these affective ratings did appear to be guided by a directive search process instigated by the

perceived arousal.

Impetus was also given to Valins' self-persuasion hypothesis by a 1969 Davison and Valins study. This research represented another misattribution technique, that of manipulating behavior to produce subsequent reattribution. Subjects initially reported their tolerance threshold for shock pain, and subsequently were administered a placebo and two additional shock series. The first series of shock after the placebo had been ingested was presented to subjects as being similar in intensity to the pre-placebo series, although they were actually only half the intensity of the previous shocks. Subjects therefore incorrectly thought that they had withstood an average of twice as much shock in this series before reaching their tolerance threshold. A reattribution manipulation was introduced at this point. In one condition, the participants were told that the pill they had taken was an effective pain-reducer. In an alternative condition, subjects were dehoaxed as to the nature of the pill. For the final shock series, administered at this point, subjects were led to believe that the pill effects had worn off. Results emerged as consistent with Valins' previous data. Dehoaxed subjects endured more shocks of greater intensity than did subjects in the "pain-reducer" condition. The maintenance of attitude toward the shock beyond the point of dehoaxing supported Valins' self-persuasion concept.

Similarly, the data can be seen as consistent with Bem's self-perception theory: The subjects' pain-enduring behavior was a basis for their judgments about the painfulness of the shock. This study alone does not permit the drawing of a conclusion regarding the mechanism by

which the evaluation of one's behavior affects attitude change or subsequent behavior. However, attitude-change research produces data consistent with this interpretation (Bem, 1967).

The Interaction of Cognitive and Physiological Processes

The enormous amount of research done over the last decade has aptly demonstrated the influence which external cues have on the labeling of internal states. Schachter's cognitive theory of emotion is supported by much of the literature.

A particularly pertinent extension of this research concerns the actual physiological results of the interaction of cognitive and physiological processes. The question of whether changes in the subjective reports, emotional labeling, and/or emotionally relevant behavior which is achieved through the reattribution process occurs with accompanying physiological changes was asked in 1972 by Beaman, Diener, Tefft, and Fraser, and in 1974 by Loftis and Ross. The answer to this inquiry, it was hoped, would in turn shed light on the question of whether such physiological changes, if they occur, also sustain and facilitate changes in the non-physiological measures.

Beaman, et al. examined the effects of the misattribution process in the treatment of test anxiety. Highly test-anxious subjects in a testing situation were led to believe that their arousal was due to a placebo. These subjects subsequently significantly reduced their scores on a test anxiety scale. This behavior was maintained until the next experimental testing session, a period of 6 to 10 days. A series of four further studies by Svanum and Beaman (1974) pursued the notion that

actual personality traits, in this case anxiety, might be changed through manipulation of information presented to the subject. The studies employed Bem's lie light paradigm (Bem, 1965) and results were interpreted in line with Bem's self-perception theory. Briefly, highly-anxious subjects were asked to read either a high-anxious statement in the presence of a lie light, or a low-anxious statement in the presence of a truth light. As predicted, the data indicated that high-anxious individuals re-evaluated their anxiety after behaving in a manner which indicated to them that they were not as highly anxious as they had believed. This was evidenced by reduced scores on a trait anxiety scale, which were maintained over a two-week period.

Additionally, the studies showed that the effects were less marked for persons who had less ambiguous data to process (high-anxious individuals reading high-anxious statements), and that an instructional set which indicated to subjects that their feelings were normal helped to reduce trait scores also.

Employing a classical conditioning paradigm in two closely-related studies, Loftis and Ross conditioned subjects to shocks, and then attempted to promote the misattribution of the shock-produced arousal to white noise. The dependent variable was assessed as the number of Galvanic Skin Responses (GSRs) to the conditioned stimulus (CS) during extinction trials. Results of the first experiment, in which the misattribution manipulation was included during extinction trials, showed that the misattribution group did extinguish the GSR more rapidly than did the control group. This study, along with Beaman, et al., illustrated two important points. First, physiological change can

accompany the reattributional process, and second, high arousal subjects do respond to misattribution manipulations. With regard to the second point, as previously mentioned Nisbett and Schachter have reached the opposite conclusion on the basis of their 1966 study.

The second study by Loftis and Ross further supported the appropriateness of their conclusions. Subjects here, as did those in the previous study, showed a significant response to the misattribution manipulation, as evidenced by less resistance to extinction, even though the manipulation was now applied during the acquisition trials. Despite the unmistakable contingency between the CS and the conditioned and unconditioned responses, misattribution subjects still responded to that manipulation. Misattribution and the resulting fear reduction were actually facillitated when the symptoms to be misattributed were most salient.

Despite the apparent definitive results of these two studies, only speculation can be made as to the exact process by which misattribution occurs. Loftis and Ross suggested that misattribution subjects changed their perceptions about the nature of their arousal only after the obvious stimulus-response contingency was removed. This after-the-fact misattribution, similar in some respects to the self-persuasion hypothesis of Valins (1966), was tested by Loftis and Ross (1974b) in a third study. The same paradigm as before was employed, except that the independent variable (misattribution) manipulation was presented this time after both the acquisition trials and the presentation of white noise were terminated. The occurrence of "retrospective misattribution" was apparently evidenced by the significantly fewer conditioned respon-

ses during extinction in the misattribution group. A problem with this interpretation exists however. A conceivable alternative explanation for group differences in GSR responses is simply that subjects receiving a symptom list relevant to what arousal they were actually feeling were calmed by that information, producing their decreased GSR response without necessarily any reattribution to a neutral source.

Checks on the subjects' self-reports regarding attributions of arousal in both of the latter experiments revealed that misattribution subjects reported significantly fewer arousal symptoms overall than the control group, but did not differ from the controls in their attributions of arousal symptoms to noise. These subjective checks, however, did not provide clear information, since they were confounded by being obtained after the independent variable manipulation.

Calvert-Boyanowsky and Leventhal (1975) made an attempt to tease out the role of information in reattribution research. Two experiments replicating and extending Ross, Rodin, and Zimbardo (1969) were conducted to determine whether reductions in emotional behavior actually result from misattribution of arousal to a neutral source, or rather from simple informational factors which have been confounded in the previous studies.

Two conditions were added to the Ross, et al. paradigm. Faced with the threat of electric shock, subjects were given information about either relevant or irrelevant arousal symptoms, which were attributed to either white noise or to threat of shock. In the first study, subjects who received arousal information avoided shock less (the dependent variable), regardless of attribution to shock or noise. However,

no differences in actual attributions of arousal were found between arousal and no-arousal groups in a check on manipulations.

The second study showed similar results, with the additional finding that arousal information must be presented in a plausible context in order to produce the effects (reduced shock avoidance). Again, subjects' verbal reports failed to offer evidence that they were misattributing their arousal to a neutral source. The authors concluded that the effects obtained were not the result of a misattribution to a neutral source, but instead the product of the information given which was received in a plausible context and assessed by the individual using a form of reality-testing. The authors suggested on the basis of this lack of verbal reporting of reattribution, that causal ascriptions of arousal states are not so easily manipulated as researchers may have previously supposed. Furthermore, they concluded that the context in which arousal symptom information is presented is an important determinant of subsequent behavior, since information which confirms the individual's perceived reality will reduce arousal, while information which is at variance with the individual's perceived reality may produce higher levels of arousal. The authors believe that this will be true, whether or not the information received incorporates causal information. Therefore, they suggested, if physiological arousal varies as a function of type of information provided and of the individual's reality testing of it, attributions would not be meaningful.

The 1974 research of Koenig and Henrikson was an additional demonstration of the effects of cognitive information upon physiological functioning. Briefly, in the study subjects were classically con-

ditioned to respond to a CS with GSR as the dependent variable. The cognitive information next supplied to the participants indicated to them that they possessed either high or low galvanic skin-responsiveness. This experimenter-controlled (false) feedback produced a difference between conditions in subsequent maintenance of GSR during extinction trials. Subjects informed of high galvanic skin responsiveness actually maintained their GSR at a higher level than did subjects in the alternative condition.

A critical finding of these studies for researchers interested in pursuing applied techniques of reattribution is that high levels of autonomic arousal may facillitate the process of misattribution and actually result in fear reduction. A theoretical step forward was achieved also, with the evidence provided that physiological processes can be affected by interaction with cognitive factors. The process by which this occurs, however, has not been unequivocally demonstrated. Several research teams have approached the question of how the reattribution mechanism works. Among these are Loftis and Ross (1974), Valins (1966, 1972), Davison and Valins (1969), and Barefoot and Straub (1971), which have been previously presented. Additional attempts at interpretation include the work of Calvert-Boyanowsky and Leventhal (1975) and the following study by Cantor, Zillmann, and Bryant (1975).

An equally feasible, alternative explanation of the reattribution process was offered by Cantor, Zillmann, and Bryant (1975), based on Zillmann's "excitation-transfer theory" (1971). Zillmann postulated that "the critical components of an excitorary response decay relatively slowly and often remain operative after the individual has

adjusted cognitively to novel stimulation" (1975, p. 69). The essence of misattribution, then, according to Zillmann, lies in an individual's failure to distinguish between his excitation from a prior arousal when that salient stimulus is replaced by the reattributional stimulus.

The 1975 research by Cantor, et al. convincingly demonstrated the reattribution of arousal from physical exercise to that of sexual arousal. Subjects shown an erotic film just moments after pursuing a vigorous physical exercise expressed less sexual excitation from the film, than did subjects who were given a recovery period after the exercise. The latter subjects were assumed to have forgotten the salient stimulus of physical exertion, and thus attributed their lingering arousal to the film. Unfortunately, this research failed to achieve results in a crucial area: It was expected, on the basis of Zillmann's theory, that the "no-recovery" group should attribute their arousal appropriately to the salient stimulus of physical activity. The attributions of this group however, showed no significant difference in attributions from a no-arousal group (control). It appeared that Cantor, et al. replicated the standard results of previous reattribution researchers, but failed to display the mechanics by which the reattribution process occurs.

This failure to demonstrate the specific mechanics of the misattribution process was pointed out in a subsequent article by Suls (1976). Suls stated that without the actual attribution differences between groups exhibited in the data, the results of such studies can also be explained by Berlyne's theory of collative motivation. Berlyne's theory stresses that changes in the momentary level of

arousal determines the quality and quantity of emotional response. The responses of the "recovery" group in Cantor, et al.'s study can then be interpreted as having resulted from the rapid increase-decrease "arousal jag" which they were subject to, as compared to those subjects in a state of constant arousal who did not experience such a marked change.

## Therapeutic Applications of Reattribution Principles

Research in the area of attribution, especially with regard to self-perception, has demonstrated the important role which perceived causality plays both in the interpretation of our emotional behavior and in the subsequent effects of that interpretation. The process by which an individual places an emotional label on a state of physiological arousal is subject, we have seen, to cues from the environment regarding such factors as the source and level of arousal. Given the tremendous effect these cues have been shown to have on the individual's self-perception, it is hardly surprising that some researchers have turned their attention toward application of reattributional principles to correct what may be an inappropriate or detrimental causal attribution in the cognitive framework of certain individuals.

A classic study in reattribution was performed by Storms and Nisbett in 1970. Their results represented an illustration of Schachter's cognitive theory of emotion applied to the alleviation of insomnia. Assuming that insomniacs have difficulty in getting to sleep because they are highly aroused at bedtime and associate that arousal with anxiety, the authors reasoned that if that arousal could be misattributed to an emotionally-neutral cause (in this case a pill) the result might be a reduction in emotionality and a subsequent lessening

of sleep difficulties. The results of the study confirmed this expectation. Subjects given placebos to take at bedtime, who were told to expect arousal symptoms from the pill, subsequently went to sleep sooner than usual, while subjects who were told to expect relaxation symptoms took longer to get to sleep than their normal pattern. The former group presumably attributed their arousal to the pill rather than to their own emotions and as a consequence reduced their emotionality to the point where they actually went to sleep faster. The latter group, expecting relaxation, apparently attributed their high arousal at bedtime to worse-than-usual insomnia symptoms. The authors suggested that insomnia results from a cycle which includes an occurrence of symptoms, followed by worrying about those symptoms, and finally, consequent exacerbation of symptoms. Breaking this cycle, by means of a misattribution to an external stimulus, may be helpful in treatment of such a problem, as illustrated in the "arousal" group of Storms and Nisbett.

The results of Storms and Nisbett's study contradicted what might be expected if the subjects had been simply responding to suggestion. That is, subjects expecting relaxation did not respond to suggestion by relaxing, nor did subjects expecting arousal demonstrate increased arousal as would be expected from a suggestion effect. The reason for this logically appeared to be that the insomniacs were quite familiar with their usual symptoms or arousal level, and as such, had important baseline information available, against which to draw conclusions about the effectiveness of the pill. The availability of baseline information has been shown to be an important operator in the "negative placebo effect." Studies by Rickels, et al. (1966, 1967) have

indicated that the subjects who exhibit such an effect (contrary to what may be expected by suggestion) are consistently those with the greatest awareness of typical symptom level. This effect was actually detrimental when it occured in the "relaxation" group of the Storms and Nisbett study. Symptoms actually worsened, in contrast to a typical placebo effect. Subjects apparently infered a deterioration of their state due to the lack of improvement which they had expected.

The results of this Storms and Nisbett experiment have been conceptually replicated a number of times (e.g. Ross, et al., 1969; Dienstbier and Munter, 1971), however, they have not gone unchallenged in the literature. Kellogg and Baron (1975), using the same paradigm, failed to replicate the original findings. Rather, their results suggested a typical placebo reaction. Additionally these authors included a high and low-justification manipulation in the design, a factor which approached significance, indicating a possibility that subjects made attributions not only about the cause of their arousal, but also about the reasons for their behavior.

An experiment conducted by Bootzin, Herman, and Nicassio (1976) attempted to replicate and delimit the effects found by Storms and Nisbett through a variation in the focus of instructions given to the insomniacs. In their paradigm, different sets of instructions were given to subjects in each of four experimental groups with regard to the effects which each group should expect from ingestion of the pill. Subjects in one group received information that indicated physiological arousal as a side effect of the pill; instructions to another group stressed relaxation as an effect; a third group received information

which stated that an increase in sleep onset latencies would occur; and the last group was told to expect a decrease in sleep onset latencies. The authors predicted that the reverse placebo effect would occur when the pill's effects were described as affecting arousal, and that a direct suggestion effect would result from a description of the pill as affecting sleep onset latency. The results of the study, consistent with those of Kellogg and Baron rather than Storms and Nisbett, showed that a direct suggestion effect was in operation regardless of the focus of instructions. Singerman, Borkovec, and Baron (1976), using highly anxious speech phobics also reported results similar to those of Kellogg and Baron.

The manipulation of a source of arousal also created therapeutic reattribution effects in a study by Beaman, et al. (1974). These researchers, as previously discussed, were able to reduce test anxiety in subjects and maintain that behavior over a one-week period. Test anxiety was also reduced in a study by Meichenbaum (1972) through a cognitive modification treatment procedure, in which highly anxious subjects were made aware of their anxiety-engendering self-statements.

Rodin (1976) noted the effects of differential causal attributions between groups in her examination of the performance levels of menstruating and non-menstruating women. Experimentally aroused, the former group performed significantly better than the group which had no menstrual symptoms. It was suggested that the latter group did not have a salient alternative attribution for the task-relevant arousal, while the former did. The results suggested the beneficial effects of predictability and perceived normality of physiological symptoms upon

performance.

The findings of Calvert-Boyanowsky and Leventhal (1975) and Dienstbier (1972), previously mentioned, illustrated the importance of appropriate symptom information in the reduction of emotionality. The research indicated that information at variance with a person's perceived reality may result in high levels of emotionality. On the other hand, an attribution of normality may affect behavioral response in a positive way by reducing the negative emotionality (Svanum & Beaman, 1974). The reattribution therapy of Davison (1966) represented the application of this principle, in the treatment of individuals whose problematic behavior could be thought of as a function of inaccurate causal labeling. One case involved a diagnosed paranoid schizophrenic who was troubled by "pressure points" in his temples, which he attributed to "spirits." Through a combination of relaxation and reattribution training, Davison was able to persuade the patient more appropriately to attribute the pain to severe muscle tension brought on by situational pressures.

Brenden Maher (1970) extended this reattribution therapy to further limits by suggesting that schizophrenics are victims of perceptual disorders as might be caused by a faulty recticular system. Maher maintained that schizophrenics should be given an opportunity to reattribute their bizarre perceptual experiences to this nonemotional physiological source, thereby helping them to explain their behavior "normally" and subsequently to reduce their negative self-perceptions.

The manipulation of the apparent degree of arousal has also been a useful tool in certain areas of therapy. Valins and Ray (1966), for example, extended the previous findings of Valins (1966) regarding

misattribution of autonomic feedback, employing these principles in the area of systematic desensitization. Snake-phobic subjects were provided with bogus heart-rate feedback, in which the heart beat showed increases during periods when a subject received shock and a regular pattern during presentations of snake pictures. The authors predicted that subjects would infer from the feedback that while they were afraid of shocks, the snakes did not produce the level of anxiety that they previously expected. On the basis of later increased snake-approach behavior, the authors' expectations were confirmed. Two experiments which have provided evidence consistent with this false-feedback effect are Borkovec, Wall, and Stone (1974) with public speaking anxiety and Koenig (1973) with test anxiety.

The application of both Kelley's principle of control and Bem's self-perception principle for therapeutic purposes and its subsequent positive effects, can be recognized in the work of Schulz (1976), Schulz, and Hanusa (1978), Langer and Rodin (1976) and Rodin and Langer (1977). These studies examined the effects of varying degrees of perceived control and predictability on the well-being of the institutionalized aged. In the Schulz study, the author attempted to create varying degrees of control and predictability in groups of residents through three conditions in which the subjects received visitors. The three conditions employed ranged from one in which extreme control was given to the subjects as to the frequency and duration of the visits they received, to a condition in which visits were random (yoked control). Two months after the manipulations began, measurements indicated that subjects in the high prediction-and-control group were significantly superior in physical

and psychological status.

In the Rodin and Langer studies, in a similar setting subjects were also found to respond favorably to experimental manipulations which emphasized taking responsibility for their own care. Home residents in a responsibility-induced group became more active and happier than did a comparison group who were instructed that care responsibilities were in the hands of the hospital staff. The long-range outcomes of these stu-ies differed substantially however. A follow-up to Schulz's study at 24, 30, and 42 months indicated a decline in the status of the residents who had previously made up the improved condition. The subjects in the no-control group remained stable over time, suggesting the possible harmful effects of the discontinued experimental manipulation. The bene-ficial effects of the Rodin and Langer manipulation, on the other hand, were maintained after 18 months. This difference was attributed to the different cognitive effects of the two studies. The Schulz subjects could only attain control of an unstable factor (visits) while the Rodin and Langer patients saw themselves gaining control of their own care. This last factor could be self-attributed as a stable factor, therein producing maintenance effects even after the termination of the exper-iment itself.

In summary, reattribution principles have been shown to be effective as applied through a variety of strategies. In some cases, persons can be convinced that they are not aroused or are less aroused than they had thought, thereby reducing the negative emotionality which can exacerbate problematic symptoms. Individuals can also learn to readjust inappropriate causal attributions to more correct internal or

external factors. Along with this often goes the approach of changing an "abnormal" attribution to a normal one, with the hope of reducing the parallel negative emotionality. Finally, if healthy attributions can be made and/or healthy behaviors performed, a strategy which implements self-perception principles can help to maintain these responses.

Psychologically-oriented Approaches to the Reduction of Dental Anxiety

A variety of techniques have been employed in the dental office by recent researchers in attempts to reduce the negative emotionality of the dental experience. Due to the recognition that early experience is important in the formation of dental fears, one initial research strategy has been to formulate methods of nonstressful introduction to the dental procedure to be used with children during their first encounter with the dentist. Such an approach was used by Rosengarten (1961) in a study in which children were brought to the dentist's office for a previsit before the date of their actual treatment. By providing a simple explanation of the dental tools and procedures used, Rosengarten hoped to provide an innocuous introduction to the dental office for the children. He found that children from ages three to four-and-one-half years benefited significantly from the previsit experience (as judged by their later dental chair behavior) while older children (five years) showed no positive effects above control baselines. A similar technique was used by Laufer, Rosenzweig, and Chosack (1964) with six and seven-year-old girls. The previsit, as compared to a non-previsit group, was found to significantly reduce fear at the time of the subsequent treatment, as measured by pulse rate and blood pressure. These effects are interpreted as having

resulted from the desensitization to the dental situation which the previsit supposedly provided.

Another method for introducing a child to dentistry in a positive way is through model learning. Research using this technique generally involves having the child patient view a videotape in which another child exhibits positive behavior during dental treatment and is verbally reinforced by the dentist. In a 1974 study, Machen and Johnson exposed preschool children to either desensitization therapy (explanation and introduction of the office procedure) or model learning therapy before undergoing dental treatment. The two groups displayed similar levels of significantly less negative behavior during their subsequent treatments on both a second and third visit, than did a control group.

In 1975, Melamed, Hawes, Heiby and Glick found that, compared to a group viewing an unrelated film, children who observed a film of a peer model coping with the dental treatment, themselves demonstrated more cooperative and less disruptive behaviors as they underwent similar subsequent treatment procedures. The modeling group was rated by the dental staff as less anxious also, although physiological and self-report indices of arousal did not differ across situations. An additional study by Melamed (1976) indicated that peer modeling of the specifics of the dental experience was a more effective way to achieve such results than was supplying the same information without a model.

The effectiveness of modeling with children having prior dental experience was investigated by Cherlock and Bornstein (1979) using both single and multiple models presented in separate conditions as either consistently or progressively nonanxious. Rather than viewing a film,

the children in this study were asked to imagine the scenes appropriate to their experimental condition. Results using this covert modeling method indicated that the children in all conditions, including the control, consistently reduced anxiety. The type and number of models visualized did not significantly affect behavioral anxiety reduction.

Modeling has been one strategy applied to adult dental patients also. Shaw and Thoresen (1974) used a combination of relaxation and modeling with adult dental phobics and found that this combined technique produced a significant increase in the number of patients who had their dental work completed, as compared to a control group. Along with this behavioral change, a significant reduction in reported arousal and an improvement in attitudes toward the dental experience were produced. These researchers also employed a technique of systematic desensitization with an additional group of patients. This latter method used an audiotape which guided patients through a series of imageries along with a relaxation exercise. Results indicated that desensitization was also effective in producing positive behavioral change and reduced arousal in self-report measures. The modeling method did, however, produce a trend toward more positive attitude and behavior change than the desensitization procedure ($p = .14$).

Wroblewski, Jacob, and Rehm (1977) assessed the contribution of relaxation instructions to this combined procedure of modeling and relaxation mentioned above. In a comparison study of a modeling group, a modeling-plus-relaxation group, and a placebo group, no differences emerged between groups with regard to self-reports of anxiety. However, the addition of relaxation to modeling produced a dramatic improvement

in the related goal behavior (obtaining subsequent dental care).

In summary, both overt symbolic modeling and desensitization have been used effectively in the dental situation to produce desired change on behaviorally based measures. Results of research are a bit more variable with regard to possible changes above control group baseline in measures of staff observational ratings and patients' self-reports of anxiety and attitudes. Studies have noted the maintenance of achieved treatment effects for these techniques which range from three to twelve weeks.

Additional research, performed by Corah, Bissell, and Illig (1979) suggested that relaxation and distraction techniques may be effective in alleviating dental anxiety. In the relaxation condition of this study, subjects listened throughout their dental treatment to a tape recording of relaxation instructions. In the distraction condition, patients in treatment were able to play a video "ping-pong" game on a moniter mounted above the dental chair. Subsequent ratings by patients indicated that both techniques reduced stress below the level of a control group. Also, the research indicated that perceived control (as produced through the use of a stop button controlled by the patient) was ineffective in reducing anxiety.

# CHAPTER 2

## RATIONALE FOR THE PRESENT STUDY

The possible positive therapeutic effects of the application of reattribution principles, and also the limitations of such, are suggested in the previously cited literature. These principles appear to be most appropriately applied in a situation where individual adjustment difficulties are at least partially a result of a labeling, or attributional process. Often a redirection of an individual's attention to alternative causal factors proves to be a helpful step toward reassessment of the problem by the individual and possible reduction of negative emotionality. The present study is an attempt to apply the principles established by the attribution literature to a common problematic situation, where possible positive consequences may result from their application.

To a great number of persons, a visit to the dentist's office is an experience laden with anxiety. The arousal symptoms which accompany dental treatment very easily can be attributed to the most salient stimulus in the situation--the dentist and fear of the dental treatment. However, as Valins and Nisbett (1972) point out, while fear is no doubt a major source of the arousal symptoms, due to the conditioning which has occured in the past, the physiological activity which is part of the experience of fear can also be caused by a typically unrecognized factor, the physiological effect of the local anesthetic used.

Dentists often inject an anesthetic solution which includes a vasoconstricter, typically epinephrine (adrenalin). This is needed to retard the absorption of the anesthetic, in order to maintain its effectiveness. The epinephrine commonly produces arousal symptoms in a patient which, as Schachter (1962) suggested, creates a need in the individual for explanation. It is quite likely that the emotional label subsequently applied to this autonomic arousal by most dental patients is "fear", despite the fact that this attribution may be somewhat inappropriate.

It is a short step in logic to recognize the potential effects which might be achieved through reattribution, by simply informing patients of the drug's physiological side-effects. This information might reduce the tendency of the individuals to interpret their arousal as indicative of high anxiety. Quite possibly then, an aroused patient who can reattribute autonomic arousal at least partially to a neutral source (the drug) may leave the office under the impression that he/she has felt less fear than usual. A further implication from the Beaman, et al. (1972) and Loftis and Ross (1974) studies is that a reattribution of arousal may even serve to subsequently reduce those physiological effects which actually have been increased by applying a label of fear to one's emotional state.

The present study, then, is basically an attempt to demonstrate a reattribution process in a dental office. No deception is necessary in the experimental manipulation and a successful application of such would appear to be beneficial to both patients and dentist. A further aim of the study is to identify the type of individual who is most responsive to the reattribution process in this situation, and to

assess the relative effects and merits of the application of the reattribution process. This study will also provide a basis for follow-up work regarding the maintenance of any attitude or behavior change which may be produced through reattribution. Although the results of this experiment will no doubt be somewhat situation-specific, it may provide data which can suggest both use of its principles in other applied areas, and an extension of basic theoretical statements.

An experiment performed by Zuckerman (1974) has previously tested this possibility of reattribution effects in the dental office. However, crucial methodological flaws and a subsequent lack of interpretable results suggests that a refined study is appropriate. The Zuckerman study included both an injected-informed group, as suggested above, and an alternative group in which subjects were informed that arousal symptoms would be reduced by the injection (injected-misinformed group). The author expected that: (1) The former group, by attributing their arousal to the injection, would subsequently decrease anxiety, and (2) the latter group, when experiencing arousal that they did not expect, would attribute it to dental fear, thereby increasing their reported anxiety. Results of the study failed to support either hypothesis, although a post-hoc analysis indicated that the hypothesized effects did occur in those subjects who initially reported high pre-treatment anxiety. This outcome is surprising in light of previous research (Conger, et al., 1976; Klemp & Leventhal, 1972; Nisbett & Schachter, 1966) in which highly-anxious subjects were least responsive to a reattribution manipulation. Such studies represent a discouraging finding in terms of possible clinical applications of reattribution

theory. However, as previously noted, Beaman, et al. (1972) and Loftis and Ross (1974) did successfully manipulate the responses of highly-anxious subjects.

With regard to Zuckerman's findings for the dental situation, it appears quite possible that subjects who are given a plausible alternative explanation for their arousal symptoms will persuade themselves of the accuracy of this information if the arousal symptoms are present to validate their cognitions. This is the process postulated by Valins' self-persuasion hypothesis. The individuals affected by the manipulation in this case would be those who definitely display arousal symptoms while low-arousal subjects may disregard the information as inaccurate.

Also, if the retrospective reattribution theory of Loftis and Ross is credible, it is possible that pre-treatment high-arousal subjects could also compare and relate the new cognitive input to their past experience more readily than could low-arousal subjects, and recognizing the feasibility of the new information, make a reattribution of their arousal. On the other hand, Zuckerman's results were based completely on post-hoc examination of the data. As such they must be approached with caution, despite their encouraging therapeutic implications. It appears important now to provide a definitive statement as to the possibility of reducing fear in highly anxious dental patients. The present study will attempt to do so.

As mentioned, the original Zuckerman dental study contained a worthwhile basic design, but numerous shortcomings also, which will be addressed in the present study. Simple changes, such as a stronger manipulation and a more direct check of its effectiveness, tighter

controls on extraneous variables, the addition of two blind raters for behavioral observation, and a sharper conceptual differentiation between physiological arousal and labeled emotion, could help to produce the desired reattribution effects for the present design and pinpoint the mechanics of its process. Also, additional pre-treatment information will be gathered in this study, regarding past dental experience and arousal levels. Finally, as mentioned previously, the groundwork will be laid for follow-up work regarding the maintenance of attitude or behavioral change.

The basic paradigm will involve two experimental conditions plus a control group. In the first condition, subjects will be informed of the physiological effects of their injection (Drug-informed group). It is predicted that subjects in this group will reattribute the cause of at least a part of their arousal to the neutral source provided (the drug injected) and will therefore perceive themselves as having felt less fear in the dental chair than will the control group. It is also feasible that subjects in the informed group might reduce their actual arousal as a result of the reattribution process. A measure for this possible effect will be taken.

The second experimental group will be a "normality" condition, in which subjects will be informed that their reactions to the dental situation are normal. This condition will serve as a comparison for the informed group in that it may help to tease out the effects which a reattribution to normality may produce, and to compare the magnitude of this effect to that which is present in the reattribution to drug. It is predicted that the subjects in this Normality condition also will

reduce their attributions of arousal to fear, however the extent of this effect relative to that of the Drug-informed group is not predicted at this time. In the Normality condition, as in the Drug-informed group, it is possible that reported arousal may be reduced as a result of the reattribution to normality, and such effects in comparison to the control group will be examined.

# CHAPTER 3

# METHOD

## Overview of Experimental Design

The present study attempted to assess the possible effects of information provided to dental patients regarding the physiological side-effects of an injection of a local anesthetic agent, xylocaine (novocaine), on their subsequent subjective reports of arousal and their causal attributions for the arousal. In each of three dental offices, three groups of patients were administered the drug as part of their regular treatment. After injection, one group of the patients was provided with information regarding the symptoms which are side-effects of the drug injected (Drug-informed group). A second group was provided with the same information regarding the symptoms of arousal, but was not informed as to the cause of such arousal--only that such symptoms are normal in the dental situation (Normality group). A final group was provided with no such information from the experimenter, thus representing the usual, non-experimental dental situation (Control group).

Dependent measures included an assessment of each patient's arousal level which was provided independently by both the dentist and his chairside assistant, and a subjective report from the patient of felt arousal during treatment and his/her attributions of cause for the arousal. Data were also collected regarding the age and prior dental experience of the subject and pulse rate at the time of treatment.

Finally, each patient provided a self-report of the usual level of arousal felt during past dental experiences, and his/her perceived normality, level of self-focus, and reassurance felt during the present dental visit.

The possibility of the maintenance of any attitude or behavior change due to the information was also assessed in this study. In one of the offices used for study, subjects returned for a regularly scheduled second dental appointment from one to three weeks after the original. This visit provided the opportunity to measure their arousal levels and causal attributions again to provide information about the maintenance of experimental effects over time.

Subjects

One hundred and fifty adult dental patients in three local dental offices served as subjects. Inclusion in the study was made on the basis of several criteria. First, in all cases subjects were chosen who had had no or very minimal contact with the particular office or dentist involved before the time of the experimental treatment session. Second, all of the patients chosen for the study were scheduled for treatment with an injection of a local anesthetic. Third, patients were chosen who were having a particular type of dental work performed, so as to keep the treatment variable controlled within each office. Treatments did vary between offices and results of the study were analyzed with this in mind. In Office 1, the student dental service on the university campus, the 60 patients (30 male, 30 female) were scheduled for routine operative dentistry with an injection of a local anesthetic.

Office 2 was that of an oral surgeon; therefore, subjects selected were those who were having minor oral surgery performed under a local anesthetic. Due to a shortage of available patients, only 15 males and 15 females participated from this office. Office 3 was also that of an oral surgeon and similar procedures as with Office 2 were followed. This last office included 30 male and 30 female patients.

## Procedure

At the time the subject was seated in the dental chair, the experimenter asked if he/she would take the time during the course of treatment to fill out two questionnaires. The subjects were informed that their answers on the questionnaires would be confidential and that completion was voluntary. Subjects were led to believe that the experimenter was a part of the office personnel and the questionnaires were a part of the normal routine of the office. As mentioned previously, patients chosen had little or no experience with the offices included in the study so that the presentation of the questionnaire would not appear out of the ordinary.

Pre-treatment questionnaire. The purpose of the first questionnaire was to obtain a self-report of the usual level of arousal felt by the patient in the dental chair. Data were also obtained regarding the extent of previous dental experience and age of the patient. This questionnaire was filled out by the patient just after being seated in the dental chair (see Appendix A).

Physiological measure. At the time that the first questionnaire

was completed, the experimenter noted the pulse rate of the patient.

Independent variable. Subjects were randomly assigned to one of three conditions within each office. The groups were balanced for sex (half male, half female). In Condition 1 (Drug-informed) the experimenter entered the room a few minutes after the injection of xylocaine had been administered and verbally presented the following information:

> Do you feel any numbness in your mouth yet? Good, the doctor should be back in just a few minutes. Are you comfortable? Just let us know if we can do something to help make you more comfortable. Okay?
>
> You will also, no doubt, feel some symptoms in your body which will be from the drug. The xylocaine that we use (you may have heard it called "novocaine"), just like most dentists, contains some adrenalin, which is the same substance that your body produces naturally at those times when you get suddenly excited or afraid. Do you know that feeling? So you might feel symptoms just like that--jitters, tenseness in your chest or stomach, butterflies in your stomach, sweaty palms or more perspiration, or some speeding-up of your breathing or heart rate. Some people even feel a little light-headed or dizzy from the drug. You might have noticed these symptoms when administered various types of novocaine before, too. Some people feel all of these symptoms and other people feel only a few of them. You may feel them at any time during the dental treatment--the drug works a bit differently for each person, but please remember that such feelings are the direct result of the drug administration.

The same procedure was used in Condition 2, the Normality group, as in the previous case, except for the particular content of information presented:

> Do you feel any numbness in your mouth yet? Good, the doctor should be back in just a few minutes. Are you comfortable? Just let us know if we can do something to help make you more comfortable. Okay?
>
> People in the dental chair typically feel some arousal symptoms in their bodies, such as jitters, tenseness in the chest or stomach, sweaty palms or more perspiration, or some speeding-up of the breathing or heart rate, or butterflies in the stomach. Some people even feel a little light-headed or dizzy. It's completely normal to feel that way. You might have noticed such

symptoms in the dental office before too. Some people feel all of these symptoms and other people feel only a few or none at all. It's a bit different for each person.

For condition 3, the control group, the experimenter did not re-enter the room at this time. No information was given to the patient by the experimenter. This condition then represented the regular routine of the office.

Observer assessments. Both the dentist and the chairside assistant provided independent ratings of each patient's display of arousal while in the dental chair. This allowed assessment of patient arousal other than by the self-report of the subject. Both dentist and assistant were blind to all three of the conditions (see Appendix B).

Both the total length of time spent in the dental chair and the total length of time under actual treatment were recorded for each patient by the experimenter.

Post-treatment questionnaire. (See Appendix C.) The second questionnaire was adminstered immediately after the dentist finished treatment. On this questionnaire subjects were asked to report the level of arousal which they had felt during the present treatment and to note whether they had felt any of a list of symptoms and the extent of each, if felt. They were also asked to attribute the cause of any arousal felt (from a list of causes provided). Finally, the questionnaire asked for self-report information with regard to the subject's perceived normality in this dental situation, his level of self-focus, and the reassurance he felt due to information provided to him.

As a direct check on the manipulation, subjects were asked on the

questionnaire whether they had received information about the effects of the novocaine injection and to briefly summarize such information. This check assessed whether the information provided in the Drug-informed condition had been noted and retained by the patients in that particular group. Only one patient could not remember the basic contents of information which had been provided and was therefore eliminated from the study.

Follow-up measures. For the purpose of later assessment, follow-up measures were recorded during a second visit for fourteen patients in Office 1. These individuals returned to the office for operative work one to three weeks after their initial (similar) treatment. The measures taken included a pulse reading, as previously, and the completion of the same post-treatment questionnaire. Follow-up measures were not taken with all patients in all offices because of the fact that return visits within a reasonably short period of time were rare.

# CHAPTER 4

# RESULTS

## Office 1

Pre-treatment group differences. The pre-treatment data were first compared across the three conditions by means of analysis of variance. Results revealed that no significant differences existed between the means of the groups with regard to either past dental experience or typical arousal level (see Table 1). A pre-treatment difference did emerge (see Table 2) between the mean ages of the groups, $F$ (2,57) = 4.61, $p$ = .014, with the mean of the Drug-informed group significantly higher than the Normality group (26.55 vs. 23.00, Scheffe's Test, $p$ <.05). Analysis of covariance was used in appropriate subsequent analyses to adjust for this initial discrepancy.

The pulse of the patient, taken before the injection, served as a physiological data source for initial level of arousal. No significant differences in mean pulse rate existed between conditions. Also, pulse rates did not correspond highly with typical arousal level ($r$ = .04, $p$ = .76) or with the patients' self-reports of arousal felt at the present visit ($r$ = -.006, $p$ = .97). A significant positive correlation was found between the pulse rate of the patient and the dentist's post-treatment rating of patient arousal level ($r$ = .32, $p$ = .01). A significant relationship was not found between pulse rate and the assistant's ratings ($r$ = .15, $p$ = .26).

Length of treatment. Analyses indicated that no differences between group means existed with regard to the time spent in actual treatment during the present dental visit or the total time spent in the dental chair (see Table 3).

Attributions of arousal. Initial analyses examined the effects of the independent variable manipulation (condition) on the patients' attributions for their arousal. A one-way analysis of variance indicated a significant overall effect for attributions of arousal to the drug injection, $F$ (2,57) = 10.49, $p$ = .004. Subsequent Scheffe's tests performed on the means indicated that the Drug-informed condition differed from the Normality group ($p < .05$) and from the Control group ($p < .05$). The Normality and Control groups did not differ significantly (see Table 4).

A similar analysis of variance performed on the data representing subjects' attributions to fear (Table 5) revealed no significant differences between conditions, $F$ (2,57) = 1.78, $p$ = .18, although the mean of the Drug-informed group displayed a slight trend in the hypothesized direction. An analysis of covariance was used to adjust for the effect of typical arousal level of the patient, which was highly related to fear attributions ($r$ = .64, $p$ = .001). The results indicated a stronger trend yet in the predicted direction, although this was not statistically significant, $F$ (2,56) = 1.53, $p$ = .23. In this latter case, the means for the Drug-informed, Normality, and Control groups were, respectively, 3.17, 4.36, and 3.78.

Subjects' attributions for their arousal were also examined for

possible sex differences. The data indicated no significant sex effects or interaction effects between sex and condition for either attributions to the drug, $F$ (1,54) = .31, $p$ = .58, $F$ (2,54) = .42, $p$ = .66, or for attributions to fear, $F$ (1,54) = .14, $p$ = .71, $F$ (2,54) = .91, $p$ = .41, respectively.

Arousal level. The effect of the experimental manipulation upon the subjects' self-reports of arousal experienced during the current visit was examined through an analysis of covariance. Given the initial mean age differences among the conditions and the high existing correlation between age and arousal ($r$ = -.39, $p$ = .002), it was necessary to covary out the effect of age in this analysis. Results revealed no significant differences among the conditions, $F$ (2,56) = .47, $p$ = .63.

The levels of each of the individual symptoms reported by patients on the post-treatment questionnaire were summed to produce an overall symptom level for each subject. Examination of this data found no mean symptom level differences between conditions.

No sex differences or interactions between sex and condition appeared with regard to typical arousal level, $F$ (2,57) = .62, $p$ = .43, and $F$ (2,54) = .51, $p$=.60, respectively, or present arousal level, $F$ (2,57) = .92, $p$ = .34, and $F$ (2,53) = 2.01, $p$ = .14, respectively. Within the conditions, a sex difference in arousal level was found to be significant in the Drug-informed condition and marginally significant in the Normality group, where in both cases males reported greater arousal than did females, $F$ (1,17) = 5.26, $p$ = .035, and $F$ (1,17) = 3.53, $p$ = .078, respectively.

The observational reports of the dentist and the assistant provided a second set of data regarding the patients' level of arousal, as illustrated in Table 3. The interrater reliability achieved between these independent raters was .35 ($p$ = .007), however neither of these observational reports correlated significantly with the self-report of arousal offered by patients ($r$ = .19, $p$ = .15; $r$ = .21, $p$ = .11, respectively). An analysis of variance using these behavioral reports of arousal indicated that no significant mean differences existed between conditions with regard to the arousal displayed by patients.

Additional measures. In order to assess the cognitive influences which the various experimental manipulations provided to the subjects, self-reports were obtained from the patients with regard to their perceived levels of normality, self-focus, and reassurance felt during the experimental dental visit. An examination of each of these factors across conditions found no significant differences in any case (see Tables 7, 8, and 9). Also, no sex effects or sex by condition interactions were found to exist for these variables. Thus, reassurance and/or a feeling of normality were not differentially experienced by any one group, nor was any one particular group of subjects more self-focused than the others during their dental treatment.

Within-condition analyses. Within the Drug-informed group, a regression analysis was employed to determine the contribution which symptom level, age, sex, arousal, treatment time, and self-focus made to an individual subject's level of attributions of arousal to the drug injection. None of these variables provided useful predictive value.

A within-condition correlation matrix also indicated no significant relationship between attributions to the drug and attributions to fear ($r$ = .28, $p$ = .23).

Maintenance of effects. Data werecollected at a follow-up visit made by fourteen of the patients (see Appendix E). An examination of the group means reveals no substantial changes in arousal levels or attributions of patients from their first to the second visit. It should be noted that three of the five patients in the Drug-informed group who did return for their second visit still attributed part of their arousal to the drug at that time. In fact, these three individuals reported that the drug was as much or more a source of their arousal as was fear. These attributions of arousal to the drug at the follow-up visit do not, however, represent a statistically significant difference effect over the other two conditions.

Office 2

Pre-treatment group differences. Analysis of the pre-treatment data revealed no significant differences between the means of the groups with regard to age, past dental experience, typical arousal level, or pulse rate. The individual pulse rates recorded did not correlate significantly with either the patients' self-reports of typical or present arousal levels ($r$ = .17, $p$ = .37 and $r$ = .27, $p$ = .15, respectively). Similarly, no significant correspondence was observed between pulse rate of the patient and either the dentist's or assistant's behavioral rating of the patient ($r$ = .29, $p$ = .12, and $r$ = .23, $p$ = .21).

A significant interaction effect between sex of the subject and

condition occurred for typical arousal level, $F$ (2,24) = 3.56, $p$ = .044. Females reported a significantly higher degree of typical arousal than did males within the Normality condition, $F$ (1,8) = 5.76, $p$ = .043. A reverse effect occurred in the Control group, where males reported an initial nonsignificantly higher typical arousal level, $F$ (1,8) = 2.89, $p$ = .13. A minimally higher female mean occurred in the Drug-informed group.

Length of treatment. No treatment differences were found among the groups, as evidenced by similar means on the variables of total time in the dental chair and total time in actual treatment (see Table 3).

Attributions of arousal. A significant overall effect for attributions of arousal to the drug injection was found through an analysis of variance, $F$ (2,27) = 12.87, $p$ = .0001, and a subsequent Scheffe's test indicated that the Drug-informed subjects were significantly higher than either of the other two groups ($p$ <.05). As expected, the Normality and Control groups did not differ.

An analysis of variance performed on the data of attributions to fear over the three conditions indicated no significant differences, $F$ (2,27) = .147, $p$ = .86. As with the previous office, however, the means of the Informed and Control groups were again in the predicted direction. As illustrated in Table 5, the mean of the Normality group in this case was also in the anticipated direction. An analysis of covariance which adjusted for typical arousal level of the patient moved the means even more strongly in the predicted direction, although as previously, not to the point of statistical significance, $F$ (2,26) =

= .58, $p$ = .57. In this latter case the adjusted means of the Drug-informed, Normality, and Control groups are, respectively, 3.44, 4.22, and 4.85.

An examination of sex differences in the subjects' attributions of arousal revealed no significant main sex effects for either attributions to the drug or attributions to fear, $F$ (1,24) = .045, $p$ = .83, and $F$ (1,24) = .004, $p$ = .95, respectively. However, a significant interaction effect between sex and condition occurred with regard to attributions to fear, $F$ (2,24) = 4.83, $p$ = .017. In the Drug-informed and Normality conditions, females attributed more of their arousal to fear than did males, although this was not significant in either condition. The reverse effect was present in the Control group, where males reported significantly more fear attributions than did females, $F$ (1,8) = 8.07, $p$ = .02. One-way anovas subsequently indicated that, over the conditions, neither the male or female pattern reached significance with regard to attributions to fear, $F$ (2,12) = 3.51, $p$ = .065, $F$ (2,12) = 1.70, $p$ = .124, respectively.

Arousal level. A one-way analysis of variance examined the effect of the experimental manipulation upon the subjects' self-reports of arousal and found no significant differences between conditions, $F$ (2,27) = .41, $p$ = .67. Similar analyses performed with the observational data provided by the dentist and the dental assistant indicated no significant differences between the groups on these measures either. The interrater reliability between the dentist and the assistant was significant at the .001 level ($r$ = .85). In this office

the observational reports of the dentist and the assistant both corresponded highly with the self-reports of arousal offered by the patients ($r$ = .38, $p$ = .049, and $r$ = .52, $p$ = .003, respectively). Again, symptom levels reported by the patients did not differ across the conditions nor were sex differences found in reported levels of present arousal.

Additional measures. Checks made on the subjects' perceived levels of normality and self-focus indicated no differential effects across conditions. However, the subjects in the Drug-informed group did report a mean level of reassurance above that of the Normality group which was marginally significant (8.20 vs. 4.80, $p$ = .057). Further examination of this variable with the sex of the subject taken into account revealed significant condition, sex, and interaction effects, $F$ (2,24) = 5.62, $p$ = .01, $F$ (1,24) = 6.27, $p$ = .02, and $F$ (2,24) = 8.67, $p$ = .001, respectively. An extreme sex difference in perceived reassurance level ($p$ <.0001) occurred in the Control group only, where males reported significantly less reassurance than did females. The Drug-informed and Control groups did not show significant sex differences in reassurance.

Within-condition analyses. The regression analysis employed to determine the predictors of attributions to the drug injection indicated that arousal level was the most influencial variable in this situation, $F$ (1,8) = 28.64, $p$ <.01. A positive relationship was exhibited between level of arousal and attributions to the drug (beta = .88, $p$ = .001). Thus, the higher a subject's self-report of arousal,

the more likely he/she was to attribute that arousal to the drug injection. Arousal level accounted for 77% of the variance in the attributions to the drug.

Office 3

Pre-treatment group differences. In comparing the pre-treatment data across the three conditions, it was found that no significant differences existed with regard to the mean age, past dental experience, or pulse rate of the patients. Pulse rate did not correspond significantly with typical or present arousal level of the patient ($r$ = .19, $p$ = .15, and $r$ = -.04, $p$ = .79, respectively), or with the observational reports of the dentist and assistant ($r$ = .07, $p$ = .62, and $r$ = .15, $p$ = .26, respectively).

Typical arousal level did show an overall significant effect in this office, $F$ (2,57) = 3.27, $p$ = .045, and a subsequent Scheffe's test indicated that the difference existed between the Drug-informed and Normality group. The mean of the former group was significantly higher than that of the latter (6.00 vs. 4.05, $p < .05$). The use of analysis of covariance in appropriate subsequent analyses adjusted for this initial discrepancy.

Length of treatment. Analyses showed no significant differences among the group means as to total time spent in the dental chair or total time in actual treatment.

Attributions of arousal. Subjects in this office demonstrated significant differences across conditions in their attributions of

arousal to both the drug injection and to fear. The overall effect obtained for attributions to the drug, $F$ (2,57) = 14.196, $p$ = .0001, was further examined through a Scheffe's test. The results revealed that the Drug-informed condition differed from the Normality group ($p < .05$) and from the Control ($p < .05$). The Normality and Control groups did not differ.

Analysis of covariance was employed to assess the effects of condition on attributions to fear. Given the original discrepancy between groups as to typical arousal level and the high correlation between typical arousal and fear ($r$ = .27, $p$ = .035), it was necessary to covary out the effects of the typical arousal variable. The results indicated that an overall effect was present, $F$ (2,56) = 5.67, $p$ = .006. A subsequent Newman-Keuls routine assessed the differences between specific groups and found the discrepancy, as predicted, to exist between the Drug-informed condition and the Control group. The mean of the former condition was significantly lower than the latter ($p < .05$). As indicated on Table 5, the Normality group mean was not significantly different from the others, but did fall in the predicted direction.

This apparent inverse relationship between attributions to fear and attributions to the drug, which is suggested by the direction of mean differences across the conditions, was also indicated by the correlation between these two dependent measures ($r$ = -.26, $p$ = .049) over the entire group of subjects. The interdependence of attributions was also found within the Drug-informed group itself, although here it

did not reach significance levels ($r$ = -.27, $p$ = .26).

A further examination of the data, taking sex of the subject into consideration, revealed the same significant effect of condition on subjects' attributions to both fear and to the drug. It also uncovered a significant sex effect along with a marginally significant interaction between sex and condition with regard to fear attributions, $F$ (1,53) = 8.48, $p$ = .005, and $F$ (2,53) = 2.45, $p$ = .096, respectively. Overall, females reported fear as a greater cause of their arousal than did the males, and this difference was significant within both Drug-informed and Control conditions, $F$ (1,17) = 4.88, $p$ = .04, and $F$ (1,17) = 8.59, $p$ = .009, respectively. The mean female and male attributions to fear did not differ within the Normality condition.

Arousal level. An analysis of covariance which adjusted for the typical levels of arousal reported by the patients revealed a significant overall effect among conditions for present arousal level, $F$ (2,56) = 3.63, $p$ = .033. A Newman-Keuls routine performed on the adjusted means determined that the Control group reported significantly more arousal than either the Drug-informed or Normality groups ($p < .05$, in both cases). The Drug-informed and Normality conditions did not differ significantly.

A further analysis of the data which examined for sex effects found no difference for the sexes with regard to typical arousal level, but slightly higher levels of present arousal reported by females overall, although not significantly so, $F$ (2,56) = 2.09, $p$ = .15. A marginally significant difference did emerge within the Drug-informed

condition, where females reported higher levels of present arousal than males, $F$ (1,17) = 4.30, $p$ = .054.

Analysis of covariance, with typical level of arousal as the covariate, revealed no significant difference between any of the groups with regard to the observational reports provided by the dentist and dental assistant. Interrater reliability between these two data sources was significant at the .001 level ($r$ = .51) and these reports both also corresponded significantly with the arousal reports of the patients ($r$ = .23, $p$ = .028 and $r$ = .51, $p$ = .001).

Additional measures. Subjects' perceptions of normality, self-focus, and reassurance did not differ across conditions, as indicated by a series of one-way analysis of variance.

Within-condition analyses. A significant predictor of attributions to the drug, based on a regression analysis, was the age of the patient, $F$ (2,57) = 4.62, $p$ <.05, which accounted for 20% of the variance. A positive relationship existed between the age of the patient and his/her attributions of arousal to the drug (beta = .45, $p$ = .045). Increased age corresponded with increased attributions to the drug.

## Meta-analysis of the Dependent Measures

The differences which emerged between the offices with regard to age of the patients, actual treatment performed, time in treatment, and arousal levels reported by the patients, precluded the possibility of combining the data for an overall analysis. These differences were

especially pronounced for Office 1, in comparison to Offices 2 and 3, as will be further covered in the Discussion section of this paper.

An alternative way of examining the pattern of results was suggested by Cooper (1979), using Stouffer's unweighted method of meta-analysis. Stouffer's method provides us with a way of combining the results of independent tests of the same hypothesis, to produce an overall probability level related to the observed pattern of results.

A meta-analysis performed across the three offices for the comparison between the levels of attributions to fear in the Drug-informed groups indicated that the probability of this pattern of results occuring by chance within three studies is .0202 ($z$ = 2.05). Similarly, an analysis performed on the comparison of Normality and Control groups revealed a probability level of .39 ($z$ = .28). With regard to the level of arousal reported by the patients, a meta-analysis across offices comparing Drug-informed and Control groups indicated a probability level of .33 ($z$ = .45). The probability of the pattern of the Normality and Control group comparisons was established at .047 ($z$ = 1.67), for the pattern across the three offices.

# CHAPTER 5

# DISCUSSION

## Attributions of Arousal to the Drug Injection

In all three of the offices, patients in the Drug-informed conditions attributed significantly more of their arousal to the drug injection, as predicted, than did subjects in either the Normality or Control groups. In these latter two conditions, subjects perceived the drug as having virtually no effect on their arousal. The responses of the Drug-informed group could, at the very least, simply be considered as an indirect confirmation that the information given to patients regarding the drug was received, remembered, and believed. The manipulation check provided on the post-treatment questionnaire in this study more directly ascertained this fact, as was its purpose, and it is believed that the measurements obtained of significant attributions of arousal to the drug in the Drug-informed condition represent more than just a second manipulation check. This response suggests also that actual reattribution of the source of arousal did occur for the individuals in the Drug-informed condition; more specifically, they reattributed at least a part of their arousal to the drug, as the experimental hypothesis predicted.

Reattribution of the source of arousal has generally been assumed to be the operating mechanism which has produced changes in behaviors or levels of anxiety in subjects in much of the past research

in this area of study. However, such studies as Cantor, Zillmann, and Bryant (1975), Loftis and Ross (1974a, 1974b), and Ross, Rodin, and Zimbardo (1969) have noted the absence of predicted changes in self-reported causal attributions, despite the other effects produced. Such indications that subjects can change their behavior or level of anxiety without a parallel change in their causal attributions violates the very basic expectation of the theory, i.e., that reattribution of causation is responsible for the experimental effects with behavior or attitude which are achieved. The data of such studies, without the reattribution mechanism directly demonstrated, are more open to alternate interpretations. Indeed, the research and conclusions of Calvert-Boyanowsky and Leventhal (1975) have suggested the alternative view that the reduced anxiety effects of reattribution studies are produced not at all by subjects who are actively reattributing the cause of their arousal, but rather as a result of the reassurance provided to the subjects by the experimental information offered which confirms their perceived reality.

The drug attribution data of this study, then, more than just offering a check on the manipulation, also indicates that contrary to the research mentioned above, reattribution was likely the operating mechanism in this study within the Drug-informed condition. Subjects did reattribute the cause of their arousal at least partially to the drug. This conclusion is supported by the fact that some individuals who did receive and remember the information provided to them in the Drug-informed condition (as evidenced by the direct check on the manipulation) nevertheless still did not endorse the drug injection as a

source of their arousal. As might be expected, individual differences do apparently exist among subjects in their responses to the experimental manipulation. An individual may receive the information and remember it, but not necessarily subsequently reattribute causation. It is important to note then, that while the check on the manipulation just confirms the reception of the experimental information, the actual endorsement of the drug injection as a source of arousal serves a dual function, both as a manipulation check and as a confirmation that reattribution has occurred.

Reports by subjects of their levels of self-monitering, normality, and reassurance fail to support the conclusions of Calvert-Boyanowsky and Leventhal. In each of the offices, levels of these three variables showed no significant differences across the conditions (with the marginally-significant exception of reassurance reports in Office 2) thereby indicating that differential feelings of normality and reassurance were probably not responsible for the experimental effects obtained.

Given that individual differences exist with regard to sensitivity and/or susceptability to a reattribution manipulation, a particular individual's response may then be possibly affected by a number of factors to varying degrees. Past research has suggested some of these variables. For example, Schachter's cognitive theory of emotions (1964) proposed that to the extent that an individual feels a need to explain an ambiguous physiological state of arousal, he would turn to external cues as a source of information. In other words, if the arousal is unusual or lacking a specific perceived cause, the individual with attention focused on this arousal may be more apt to accept

externally-supplied information to interpret this state. Furthermore, a person who is less familiar with any particular arousing situation would be more likely to accept reattribution information at that particular time than he would in more familiar encounters.

An additional hypothesis regarding individual differences involves the arousal level of the subject. The work of Conger, Conger, and Brehm (1972) and Nisbett and Schachter (1966) suggested that low arousal subjects are most responsive to reattribution cues, and in fact, high levels of arousal preclude reattribution. On the other hand, Loftis and Ross (1974a, 1974b) and Beaman, Diener, Tefft, and Fraser (1972) have demonstrated through their research, and Zuckerman has suggested on the basis of his post-hoc analysis of data (1974), that highly aroused subjects can respond to the reattribution manipulation and in fact sometimes respond more so than do less aroused persons.

The work of Valins (1966) and Barefoot and Straub (1971) has suggested that not only are individual variables important, but that situational factors may also affect the occurrence of reattribution. Following a reattribution stimulus, it appears that a subject must have both the appropriate length of time and the subsequent validating experience to cognitively grasp and hold that reattribution information in mind, and to make an actual reattribution of causation.

A secondary purpose of this study was to uncover the personality or situational factors which produce individual differential reattribution effects. Therefore, the variables of age, sex, arousal and symptom levels, treatment time, and self-focus, such as are sug-

gested by the literature, were examined in regression analyses to assess their predictive value for reattributions to the drug. The analysis of Office 2 data did reveal that a significant predictor of attributions to the drug was the present arousal level of the patient. A strong positive relationship existed between this level of arousal and the patients' attributions to the drug. This positive relationship was also found in Office 1, although it was not significant ($r$ = .35, $p$ = .12). In Office 3, arousal level did not reach significance as a predictor of attributions to the drug, and in fact a weak negative relationship existed between the two variables. The strong predictor of attributions to the drug in this office was age of the patient, which corresponded positively with drug attributions.

These inconsistencies between offices in the results of the regression analyses prohibit the clear definition of specific factors which may predispose or enhance an individual's response to the reattribution manipulation. It appears that no one factor consistently operated in a predictive capacity for all of the three offices. It is interesting to note, however, that neither increased age or high arousal level precluded the occurrence of the reattribution process, thus supporting the conclusions of Loftis and Ross (1974) and Beaman, et al. (1972) with regard to high arousal levels. Particularly in the Drug-informed condition of Office 2, the mean arousal level reported was higher than the other offices, as were also both the attributions to fear and to the drug. As noted in the results section, arousal level accounted for 77% of the variance within this condition of this office. The data may in fact be interpreted as indicating that arousal must be

felt before a reattribution of the source of that arousal can definitely be made to any causal factor. The relationship between arousal and attributions to fear does strongly support this notion in all three of the offices, where the correlation reached a .001 level in all cases.

Attributions of Arousal to Fear

Significantly fewer attributions to fear, compared to the Control group, were reported as predicted in the Drug-informed condition of Office 3. Subjects in this condition perceived fear as significantly less a cause of their arousal than did the Control group, and subjects at the same time had higher attributions of cause for arousal to the drug, above that of either the Control or Normality groups, therein suggesting the interdependence of reattributional effects.

This effect did not reach significance in Offices 1 and 2, but the means of the Drug-informed and Control groups in these two offices were consistently in the predicted direction. The meta-analysis performed on this comparison in the three offices indicated that the probability of such a pattern of results occurring by chance alone is less than two per cent. This offers support for the central hypothesis of this study, that a reattribution of arousal to the drug injection will produce a subsequent lessening of attributions to fear.

Of the two offices which did not achieve significant results, Office 1 displayed the least substantial difference in mean scores between the Drug-informed and Control groups on the variable of attributions to fear. Additional data make it possible to speculate why a stronger effect was not found. First of all, the dental proce-

dures performed in Office 1 were routine operative dentistry, in contrast to the oral surgery performed in Offices 2 and 3. Although the overall mean typical arousal level of the patients in Office 1 was quite in line with that of the patients in the other offices (see Table 1), the subsequent mean arousal for the current visit reported in this particular dental office showed a drop both from the typical level of arousal of patients within this office and from the present arousal level which was felt by the patients in the other two offices.

Also, the arousal level reported by the patients in Office 1 showed the lowest overall mean and the least variability of the offices (see Table 6). The existence of relatively low arousal levels in Office 1 was also confirmed by the low levels of patient arousal behavior which were reported by the dentist and dental assistant.

Given the low level and lack of variability in the arousal reports of subjects in Office 1, along with the intuitive notion that the situation itself was not as arousing as that in Offices 2 and 3, it seems reasonable to conclude that less of an experimental effect would occur in such a situation.

It appears then, that a subject needs to feel aroused before he/she can attribute that arousal to a source. Furthermore, it is also feasible that subjects in Office 1, even when they did feel aroused, were facing such a familiar routine that they made little use of the new cognitive information provided to them by the experimenter. In Schachter's terms (1964), the arousal felt by subjects was not particularly ambiguous or unusual for these persons, and they did not feel a need to respond to the external cues given them in order to interpret

and explain their internal feeling.

Another perspective from which to view these data is in terms of Valins' self-persuasion hypothesis (1966). The interpretation can be made that the information provided to the Drug-informed patients of Office 1 (that arousal would occur) was not subsequently verified by their own experience and therefore was disregarded.

It can then be argued that the Drug-informed patients in Offices 2 and 3, because they were facing a less familiar situation and/or because they did experience arousal which verified the information which had been given to them, were more apt cognitively to accept an explanation for their arousal.

Office 2 also did not achieve significant results in attributions to fear, although the means of the Drug-informed and Control groups were in the predicted direction. The weaker effect demonstrated in this office can most appropriately be attributed to the small number of subjects included per condition. A difficulty with small sample size is that inclusion of just one or two extreme scores can produce large effects on overall mean scores for the group. The likely presence of this problem is demonstrated by the irregularities which emerged in the analyses of sex differences within Office 2. More specifically, the males of the Control group ($n = 5$) reported higher levels of typical arousal and attributions to fear, and lower levels of reassurance than did the females. This represents a reversal of the trends which occurred in the other conditions within this office.

The attributions to fear of these Control males within Office 2 were particularly in contrast to the data obtained in Office 3, where a

significant sex effect existed both overall for the conditions and within the Drug-informed and Control groups. Females consistently reported attributions to fear at higher mean levels than did the males. It does not appear, on the basis of a male-female comparison of attributions to the drug, that one sex was differentially affected by the experimental manipulation compared to the other. Therefore, it can be suggested that females in general were more open than men in expressing their perceived fear to the female experimenter. This hypothesis is not reinforced by the data of the Office 2 Control group, of course. However, it is suggested that had more data been gathered in that particular office, a trend in line with the other conditions may have developed.

An additional concern of this study involved the attributions of arousal to fear which would occur for subjects given information about the normality of their experience. The Normality condition was included in this study to tap this factor and also to serve as a comparison for the Drug-informed condition. The results indicate that the Drug-informed condition did produce the stronger effect, as evidenced by the lower level of fear which was perceived by subjects as causal in their arousal. The Normality condition did show a trend in the predicted direction in two of the three offices, however the meta-analysis of these comparisons did not produce a significant result ($p$ = .39).

The trend in these means of the Normality group with regard to attributions to fear in comparison to the Control subjects indicates that some response to the information supplied in the Normality condition did occur. In line with the conceptualization of a reattribution

of normality as formulated by Svanum and Beaman (1974), this can be interpreted as an occurrence due to the fact that when an individual is informed of the normality of his feelings, he may subsequently perceive the causal level of his fear as being less extreme in comparison to what he originally had thought. This would not change his perception of what is normal for him in the situation, but rather would readjust his thinking in terms of how he stands in relationship to other people, and would therefore tend to lead to moderation in his comparative judgment of the part which fear played in his arousal. This reasoning would explain why the normality self-reports of subjects were not different for the Normality condition, but the fear attributions did show a tendency to decrease. As stated previously however, this effect on attributions to fear within the Normality group was not significant.

Arousal Levels of the Subjects

The research of Beaman, et al. (1972), Dienstbier and Munter (1971), Ross, Rodin, and Zimbardo (1969), and Storms and Nisbett (1970) have demonstrated reduced arousal levels as a result of the experimental reattribution manipulation. In the present study however, the reattribution manipulation did not promote such a definite effect in reducing reported arousal. In Office 3, a significantly lower level of arousal was reported in the Drug-informed condition as compared to the Control group. On the basis of these data alone, it might be suggested that subjects who reattributed their arousal also reduced their perceived level of arousal. However, Office 2 reported the reverse effect (although not statistically significant) for the Drug-informed condition

and a meta-analysis of the Drug-informed and Control comparisons across the three offices indicated that the probability of this trend occurring by chance does not fall within acceptable limits. It appears reasonable on this basis to conclude that individuals' perceptions of arousal level do not necessarily change even though they have reattributed the cause of that arousal to a neutral source.

The Normality condition of this study strongly supported the previous work of Svanum and Beaman (1974). This condition in all three offices showed a lower level of arousal compared to the Control group, and this difference was significant for Office 3. A meta-analysis performed on these group comparisons indicated that the probability of this pattern of results occurring by chance is .047. It is reasonable to conclude that, just as the normality information may have succeeded in readjusting the perceived causal level of fear, it also produced either an adjustment in subjects' perceptions of the level of arousal felt or it resulted in cognitions which actually reduced the arousal level itself. In fact, the Normality condition subjects reported arousal below the levels of either the Drug-informed or Control groups in all three offices.

The behavioral reports of patient arousal which were provided by the dentists and dental assistants did not reveal any differences between conditions for any of the three offices. However, it is difficult to place confidence in the validity of these reports. Raters were not pre-trained, and it was apparent from the verbal comments made during the study that raters often based their reports of patient arousal level on aspects of behavior which were differently emphasized

from rater to rater, and particularly between dentist and assistant. This discrepancy was suggested also by the interrater correlations obtained in Offices 1 and 3. Even though these correlations reached statistical significance, they are unacceptably low.

There appear to be two separate mechanisms in operation in this study, represented by the two separate experimental conditions. The Drug-informed subjects actually reattributed the cause of their arousal, placing less emphasis on fear and more on the drug injection as a cause of their arousal. This experimental manipulation was most effective in reducing the perceived causal level of fear, while only minimally effective in reducing reported arousal level.

On the other hand, in the Normality condition the effects obtained were in contrast to those found in the Drug-informed condition. The attributions to fear of the Normality group patients were only slightly lower that those of the Control group, while a more dramatic effect occurred with regard to arousal, as evidenced by the lower arousal reported by these patients compared to either the Drug-informed or Control groups. It is thought that these effects resulted from a reattribution to normality. Normality in this case is not conceptualized as a specific causal entity, as was the drug injection, but rather represented a new guideline to which the subjects could compare their feelings about the dental experience.

The responses of the subjects in the Normality condition suggest that a reattribution of arousal to another specifically listed source was not in operation in this group. However, the structure of the experimental questionnaire was such that it placed restrictions on the

particular entities which subjects could endorse as being causes of their arousal. Therefore, it is possible that while the Normality group did not appear to reattribute the cause of their arousal as judged by their responses on this questionnaire, a reattribution to a causal factor not listed on the questionnaire or to a diffusion of such agents feasibly may have occurred. The present study is unable to assess this alternate possibility.

## Conclusions

The present study has successfully demonstrated its predicted hypotheses. The mechanism of reattribution of arousal to the drug injection was shown to be in operation in the Drug-informed conditions of all three of the offices, and a lower level of causal attributions to fear was demonstrated as a positive result of this reattribution overall in the study and particularly within the third office. Furthermore, the manipulation employed in the Drug-informed condition was thought to be effective due to its reattribution properties, rather than simply because of any extraneous reassurance effects.

Unfortunately, due to the inconsistencies in the results of the regression analyses from the three separate offices, this study could not offer definitive evidence regarding the personality variables which differentially affect an individual's response to a reattribution manipulation. The data did suggest however, that high arousal levels are not a barrier to the achievement of reattribution effects in this situation. The study also suggested that situational variables, such as subject familiarity with the situation or a lack of felt arousal, may reduce the possibilities of reattribution occurring. The maintenance of reattri-

bution effects also failed to be effectively demonstrated in this study; however, this was to be partially attributed to the lack of initial effects which occurred with the particular subjects who returned for the follow-up visit.

Although the manipulation of reattribution was found to be effective in reducing the level of fear which was perceived as causal for arousal, it was not particularly effective in reducing perceived levels of arousal. Subjects did reattribute their physiological arousal to a less emotionally loaded source (epinephrine instead of fear), yet such a cognition did not produce a decrease in arousal levels. Based on earlier research it had been expected that being able to recognize a nonemotional source for arousal might produce a cognitively mediated lowering of that arousal.

The present study demonstrated the positive effects of providing subjects with information regarding the normality of their experience in the dental office. This information was found to result in lower perceived arousal levels, although whether actual physiological effects were obtained was not assessed in the present study. One might consider investigating this issue in future research.

The data of the present study suggest positive implications for their application in the normal routine of the dental office. Both of the experimental manipulations (drug and normality information) produced positive changes compared to normal office routine (Control group). The reattribution to the drug produced lower attributions to fear, while the normality reattribution was successful in producing a lower level of perceived arousal. It can be suggested that either of these

effects may serve to also reduce the negative emotionality which is typically experienced in the dental office, although whether such a beneficial decrease in negative emotionality actually occurred was not directly tested in this study. It is also not clear at this point whether one of the two experimental effects obtained is more desirable than the other nor whether they produce a differential effect with regard to actual physiological arousal. It is important to note that the reattribution manipulation in the Drug-informed condition and the mention of symptoms in the Normality and Drug-informed groups did not produce a negative effect through suggestion as might have been anticipated. Subjects in these groups did not appear to be sensitized to arousal by the provided information. These groups did not focus on their arousal any more than did the Control group nor did they experience heightened arousal or symptom levels.

If it can be assumed that the effects shown in the present study are indicative of the more definite beneficial changes mentioned above, a combination of the drug and normality information, which would inform patients of the particular symptoms which are common to dental patients, of the normality of such symptoms, and of the causal factors involved in arousal, would appear to be an effective innovation in the dental situation. However, further research is needed to definitely assess this possibility.

# CHAPTER 6

## SUMMARY

The present study attempted to demonstrate the operation of reattribution principles in the naturalistic setting of a dental office. It was initially assumed that patients in the dental situation label their physiological arousal as "fear", while not recognizing the physiological arousal effects which are produced by another causal factor, the local anesthetic administered during treatment.

Patients of three local offices were included in the study as they underwent their scheduled treatments. As the independent experimental manipulation, one group of subjects was verbally informed of those physiological side-effects caused by the administration of the local anesthetic, while a control group received no such information, and as such represented the normal office routine. A third group of patients was informed of the normality of the symptoms typically felt by dental patients. This latter group was included as an additional comparison to tease out and assess the effects of a reattribution to "normality."

The comparative effects of this information provided to subjects on their subsequent causal attributions for arousal and their perceived levels of arousal were assessed through self-reports as the main dependent variables. The experimental hypotheses predicted that subjects in the Drug-informed group would reattribute the source of their arousal

at least in part to the drug, thus reducing their perceptions of fear as a causal factor in arousal, and quite possible subsequently reducing their perceptions of arousal itself also. Subjects in the Normality condition were not expected to reattribute their arousal to another source, per se, but were predicted to reduce their perceptions of fear and arousal levels due to the information provided to them which might readjust their idea of how other persons react to the dental situation.

Results of the study largely supported the predictions. Compared to the Normality and Control groups, subjects in the Drug-informed conditions had significantly higher attributions to the drug and as such demonstrated that reattribution was likely the mechanism in operation. Patients in Office 3 also reported significantly lower attributions to fear within the Drug-informed condition, to a level below that of the Control group, and this pattern of results was significant across all three of the offices. Drug-informed subjects did not however report lower arousal levels, although the means showed a trend in the predicted direction.

Subjects in the Normality group were found to have significantly lower arousal levels within Office 3, and this pattern was found to be significant across the three offices.

The results of this study are favorable with regard to implications for the dental situation. Both the drug-related and normality information showed beneficial effects above that of the control group which represented the normal office routine. The data also suggested that high arousal does not preclude these beneficial effects. Finally,

increased confidence may be placed in the applicability of the findings to actual dental offices, since the study was performed in a naturalistic setting.

# APPENDIX A

## PRE-TREATMENT QUESTIONNAIRE

TO OUR PATIENTS:

In the hope of making each of our patient's visit to the dental office as comfortable as possible, we are gathering opinions from our current patients as to the efficiency of our office procedures. We have constructed this brief questionnaire with which to obtain your impressions and feelings about the dental experience.

The questionnaire consists of this set of items, to be filled out now, and a second set, to be completed after your treatment. We would certainly appreciate your comments, as they will help us to locate areas in which changes may be beneficial.

Your answers will remain totally confidential. You need not put your name on the form. Your responses will be tallied along with those of our other patients. Please answer as clearly, as honestly, and as completely as possible.

This questionnaire is completely voluntary. If you do not wish to fill it out, we certainly respect your wishes. However, your help and comments would be sincerely appreciated. Thank you.

1. Sex: ____ Male ____ Female Age: ____

2. General Dental Experience: How many times have you, in the past, had dental work performed (not including simple check-ups and cleaning)? Just estimate:

   ___Less than 5 times; ___5 to 10 times; ___11 to 25; ___Over 25

3. Have you been in for treatment with this particular dentist before?

   ____ Yes ____ No

4. It is a common experience for many patients to feel some type of physical arousal (to be "worked-up", excited, have "jitters") while receiving dental treatment. Many other persons feel quite unaroused (unexcited). On the basis of your own previous dental experiences, how would you describe your typical level of arousal while in the dentist's chair (not including simple check-ups)? Please circle the number on the line below which most closely represents your answer:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| Not at all aroused | | Some-what | | Moderately | | | Quite a bit | | Very much aroused |

# APPENDIX B

# OBSERVATIONAL RATING SCALE

| 1 2 | 3 4 | 5 6 7 | 8 9 | 10 |
|---|---|---|---|---|
| No arousal | Small Amount | Moderate | Quite a bit | Very much Arousal |
| Normal conversation; | Talks a lot; Talks faster; Asks questions; | Verbal statements of anxiety; | Verbal fear; | Crying; |
| Calm, relaxed appearance; | Alert, watchful; | "Frightened" look; (as may be noticed in eyes); | Flushed; Color change; | Tears; Big eyes; Small pupils; "Ready to leave" |
| No agitation; | Minimal fidgeting; | Fidgeting; Gripping arms of chair at times; | Active in chair; Flinching; Quite jumpy; | "Death grip"; White knuckles Extremely agitated; |
| No visible sympathetic symptoms; | | Beginning to perspire; (as may be noticed by a damp handshake); | Sweat on forehead; Flushed; | Excessive perspiration; Pale, faint; |

# APPENDIX C

## POST-TREATMENT QUESTIONNAIRE

We would appreciate if you would answer just a few short questions regarding your dental treatment today. Your answers will be totally confidential. There is no need for you to put your name on this form. Please answer as honestly and completely as you can. Thank you.

1. On the basis of your own dental experience today how would you describe your level of arousal (how "worked-up" you felt) in the dental chair?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| Not at all aroused | | Some-what | | Moderately | | | Quite a bit | | Very much aroused |

2. Did you feel any of the following symptoms during your dental treatment today? Circle the number on each line which represents how strongly you felt each of these today:

   A. "Jitters":

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| Not at all | | Some-what | | Moderately | | | Quite a bit | | Very much |

   B. Sweaty palms and/or perspiration:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|

   C. "Butterflies" in the stomach:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|

   D. Tightness in the chest or elsewhere:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|

   E. Increased breathing and/or heart-rate:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|

   F. Light-headed or dizzy:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|

(Please go on to the next page.)

3. Listed below are some of the factors in the dental situation which can produce arousal symptoms such as those mentioned on the previous page. Please mark each of the items below according to how much you feel that it contributed to your overall level of arousal (whatever symptoms you felt) today in this office . If you feel that a particular factor was not at all a cause of your symptoms or if the factor actually helped to reduce your arousal, just mark it as a "1" by circling that number on the line. Otherwise, circle the number along the line which represents how strongly the factor contributed to your arousal.

   A. The physical surroundings of the office (cleanliness, furniture, etc.):

   1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

   No effect (or reduced arousal) — Moderate effect on arousal — Very much a cause of arousal symptoms

   B. The manner or personality of the dentist:

   1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

   C. The manner or personality of the dental assistant(s):

   1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

   D. The noise level of the office:

   1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

   E. The visual presence of dental instruments:

   1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

   F. Fear of discomfort and/or fear of the dental procedure itself:

   1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

   G. The actual physical effects of drugs administered during treatment:

   1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

(Please go on to the next page.)

4. How normal do you think it is for a patient to feel the way that you, yourself, did today during your dental treatment?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| Not at all normal | | Some-what | | Moderately | | | Quite a bit | | Very much |

5. Did you pay much attention during your treatment today, to how your body was responding to the situation (that is, were you aware of the feelings and sensation in your mouth or body)?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| Not at all aware | | Some-what | | Moderately | | | Quite a bit | | Very much aware |

6. Did you receive information from the staff regarding the effects that the injection of xylocaine (novocaine) would have on your system?

____ Yes ____ No ____ Can't remember

If yes, please briefly state what you can remember of what you were told, in the following space ( a few words are plenty ):

7. If you did receive information about the injection, how reassuring was this information to you, if at all?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| Not at all | | Some-what | | Moderately | | | Quite a bit | | Very much |

# APPENDIX D

## TABLES

Table 1

Group Means of Typical Arousal Level

| | | Drug-informed | Normality | Control | Combined |
|---|---|---|---|---|---|
| Office 1 | | | | | |
| Male | M | 5.77 | 5.70 | 4.23 | 5.07 |
| | SD | 2.45 | 2.75 | 2.25 | 2.64 |
| Female | M | 3.83 | 4.90 | 4.47 | 4.57 |
| | SD | 2.79 | 2.03 | 2.59 | 2.24 |
| Overall | M | 4.80 | 5.30 | 4.35 | |
| | SD | 2.61 | 2.39 | 2.37 | |
| Office 2 | | | | | |
| Male | M | 4.80 | 2.80 | 5.60 | 4.47 |
| | SD | 3.89 | 1.48 | 3.58 | 3.11 |
| Female | M | 5.20 | 6.80 | 2.60 | 4.87 |
| | SD | 2.95 | 3.40 | 1.67 | 3.14 |
| Overall | M | 5.10 | 4.80 | 4.10 | |
| | SD | 3.14 | 3.26 | 3.07 | |
| Office 3 | | | | | |
| Male | M | 6.40 | 4.00 | 4.80 | 5.06 |
| | SD | 2.95 | 1.89 | 2.39 | 2.57 |
| Female | M | 5.60 | 4.10 | 5.30 | 5.00 |
| | SD | 2.37 | 2.13 | 2.87 | 2.45 |
| Overall | M | 6.00 | 4.05 | 5.05 | |
| | SD | 2.64 | 1.96 | 2.26 | |

Table 2

Group Means of Pre-treatment Data

| | Drug-informed | Normality | Control |
|---|---|---|---|
| | | Age | |
| Office 1 | 26.55 | 23.00 | 23.75 |
| 2 | 39.70 | 40.10 | 44.90 |
| 3 | 39.50 | 43.80 | 43.05 |
| | | Past Dental Experience | |
| 1 | 2.60 | 2.70 | 2.70 |
| 2 | 3.00 | 2.60 | 3.40 |
| 3 | 2.80 | 3.05 | 2.60 |
| | | Pulse | |
| 1 | 70.00 | 70.85 | 71.95 |
| 2 | 77.20 | 71.60 | 76.00 |
| 3 | 80.00 | 74.20 | 71.60 |

Table 3

Group Means:

Observational Ratings, Symptom Level, Length of Treatment

| | Drug-informed | Normality | Control |
|---|---|---|---|
| | Rating by Dentist | | |
| Office 1 | 2.25 | 2.75 | 2.35 |
| 2 | 4.50 | 3.10 | 3.10 |
| 3 | 4.35 | 4.05 | 4.10 |
| | Rating by Assistant | | |
| 1 | 2.55 | 2.45 | 2.95 |
| 2 | 4.30 | 2.50 | 3.20 |
| 3 | 3.65 | 3.40 | 4.25 |
| | Symptom Level | | |
| 1 | 14.00 | 17.00 | 13.35 |
| 2 | 15.60 | 13.10 | 13.40 |
| 3 | 15.80 | 13.20 | 18.90 |
| | Total Treatment Time | | |
| 1 | 35.25 | 36.00 | 35.50 |
| 2 | 18.50 | 11.00 | 13.50 |
| 3 | 13.00 | 12.50 | 15.50 |
| | Total Chair Time | | |
| 1 | 57.00 | 56.75 | 53.50 |
| 2 | 45.00 | 34.50 | 41.00 |
| 3 | 37.75 | 33.50 | 35.00 |

Table 4

Group Means

Attributions of Arousal to Drug

| | | Drug-informed | Normality | Control | Combined |
|---|---|---|---|---|---|
| Office 1 | | | | | |
| Male | M | 2.60 | 1.40 | 1.00 | 1.67 |
| | SD | 2.07 | 1.27 | .00 | 1.52 |
| Female | M | 3.20 | 1.20 | 1.20 | 1.87 |
| | SD | 2.30 | .42 | .42 | 1.63 |
| Overall | M | 2.90 | 1.30 | 1.10 | |
| | SD | 2.15 | .92 | .31 | |
| Office 2 | | | | | |
| Male | M | 4.00 | 1.00 | 1.00 | 2.00 |
| | SD | 3.16 | .00 | .00 | 2.23 |
| Female | M | 4.40 | 1.00 | 1.00 | 2.14 |
| | SD | 2.79 | .00 | .00 | 2.23 |
| Overall | M | 4.20 | 1.00 | 1.00 | |
| | SD | 2.82 | .00 | .00 | |
| Office 3 | | | | | |
| Male | M | 2.80 | 1.10 | 1.20 | 1.70 |
| | SD | 1.62 | .32 | .63 | 1.26 |
| Female | M | 3.50 | 1.00 | 1.00 | 1.84 |
| | SD | 3.06 | .00 | .00 | 2.09 |
| Overall | M | 3.15 | 1.05 | 1.10 | |
| | SD | 2.41 | .22 | .45 | |

Table 5

Group Means

Attributions of Arousal to Fear

| | | Drug-informed | Normality | Control | Combined |
|---|---|---|---|---|---|
| Office 1 | | | | | |
| Male | M | 3.60 | 5.20 | 2.90 | 3.90 |
| | SD | 3.99 | 3.36 | 2.08 | 2.93 |
| Female | M | 2.70 | 4.20 | 4.00 | 3.63 |
| | SD | 2.45 | 2.90 | 2.75 | 2.69 |
| Overall | M | 3.15 | 4.70 | 3.45 | |
| | SD | 2.70 | 3.10 | 2.44 | |
| Office 2 | | | | | |
| Male | M | 2.60 | 3.00 | 7.00 | 4.20 |
| | SD | 1.82 | 2.83 | 3.74 | 3.38 |
| Female | M | 4.80 | 5.60 | 2.00 | 4.13 |
| | SD | 4.08 | 3.65 | 1.23 | 3.40 |
| Overall | M | 3.44 | 4.22 | 4.85 | |
| | SD | 3.20 | 3.37 | 3.72 | |
| Office 3 | | | | | |
| Male | M | 2.12 | 3.74 | 3.75 | 3.23 |
| | SD | 1.57 | 2.79 | 3.02 | 2.54 |
| Female | M | 3.98 | 3.96 | 7.95 | 5.27 |
| | SD | 2.62 | 3.80 | 3.27 | 3.71 |
| Overall | M | 2.62 * | 4.29 * | 5.84 * | |
| | SD | 2.24 | 3.25 | 3.77 | |

* Adjusted means

Table 6

Group Means

Arousal Level: Self-report at Present Visit

| | | Drug-informed | Normality | Control | Combined |
|---|---|---|---|---|---|
| Office 1 | | | | | |
| Male | M | 4.20 | 4.60 | 3.89 | 4.23 |
| | SD | 2.07 | 2.72 | 2.13 | 2.28 |
| Female | M | 2.30 | 3.00 | 4.61 | 3.31 |
| | SD | 1.85 | 2.00 | 1.96 | 2.03 |
| Overall | M | 3.68 * | 3.52 * | 4.10 * | |
| | SD | 1.94 | 2.46 | 2.44 | |
| Office 2 | | | | | |
| Male | M | 4.80 | 2.60 | 6.00 | 4.47 |
| | SD | 3.11 | 2.07 | 3.39 | 3.07 |
| Female | M | 5.60 | 5.40 | 2.40 | 4.47 |
| | SD | 3.58 | 3.65 | 1.67 | 3.25 |
| Overall | M | 5.20 | 4.00 | 4.20 | |
| | SD | 3.19 | 3.16 | 3.16 | |
| Office 3 | | | | | |
| Male | M | 3.69 | 3.44 | 5.42 | 4.18 |
| | SD | 2.85 | 1.65 | 1.95 | 2.28 |
| Female | M | 5.91 | 3.56 | 6.18 | 5.22 |
| | SD | 2.58 | 2.99 | 3.06 | 2.85 |
| Overall | M | 4.27 * | 4.04 * | 5.79 * | |
| | SD | 2.80 | 2.35 | 2.55 | |

* Adjusted Means

Table 7

Group Means of Perceived Normality

| | | Drug-informed | Normality | Control | Combined |
|---|---|---|---|---|---|
| Office 1 | | | | | |
| Male | M | 5.80 | 6.10 | 6.40 | 6.10 |
| | SD | 2.62 | 2.64 | 2.84 | 2.41 |
| Female | M | 5.30 | 6.40 | 7.20 | 6.30 |
| | SD | 2.11 | 2.72 | 2.25 | 2.55 |
| Overall | M | 5.55 | 6.52 | 6.80 | |
| | SD | 2.33 | 2.61 | 2.53 | |
| Office 2 | | | | | |
| Male | M | 6.20 | 5.20 | 5.80 | 5.73 |
| | SD | 3.83 | 2.95 | 3.11 | 3.26 |
| Female | M | 7.40 | 7.40 | 5.80 | 6.87 |
| | SD | 2.41 | 2.97 | 3.11 | 2.87 |
| Overall | M | 6.80 | 6.30 | 5.80 | |
| | SD | 3.08 | 3.02 | 2.94 | |
| Office 3 | | | | | |
| Male | M | 6.30 | 6.70 | 7.10 | 6.70 |
| | SD | 2.67 | 2.87 | 2.47 | 2.47 |
| Female | M | 7.70 | 5.90 | 8.80 | 7.46 |
| | SD | 1.77 | 2.60 | 1.75 | 2.53 |
| Overall | M | 7.00 | 6.30 | 7.95 | |
| | SD | 2.32 | 2.70 | 2.26 | |

Table 8

Group Means of Level of Self-Focus

| | | Drug-informed | Normality | Control | Combined |
|---|---|---|---|---|---|
| Office 1 | | | | | |
| Male | M | 7.20 | 6.60 | 7.80 | 7.20 |
| | SD | 2.04 | 3.37 | 2.35 | 2.40 |
| Female | M | 7.50 | 6.60 | 7.60 | 7.24 |
| | SD | 2.12 | 2.76 | 1.58 | 2.05 |
| Overall | M | 7.35 | 6.60 | 7.70 | |
| | SD | 2.03 | 3.00 | 1.95 | |
| Office 2 | | | | | |
| Male | M | 7.20 | 8.40 | 7.80 | 7.80 |
| | SD | 3.83 | 1.14 | 2.86 | 3.12 |
| Female | M | 6.20 | 6.00 | 7.00 | 6.40 |
| | SD | 2.17 | 4.06 | 3.16 | 3.72 |
| Overall | M | 6.70 | 7.20 | 7.40 | |
| | SD | 2.98 | 3.08 | 2.88 | |
| Office 3 | | | | | |
| Male | M | 5.80 | 5.20 | 6.10 | 5.70 |
| | SD | 2.90 | 2.39 | 2.77 | 2.79 |
| Female | M | 7.20 | 5.60 | 7.50 | 6.76 |
| | SD | 2.90 | 3.00 | 2.51 | 2.79 |
| Overall | M | 6.50 | 5.40 | 6.80 | |
| | SD | 2.91 | 2.64 | 2.67 | |

Table 9

Group Means of Perceived Reassurance

| | | Drug-informed | Normality | Control | Combined |
|---|---|---|---|---|---|
| Office 1 | | | | | |
| Male | M | 5.50 | 6.40 | 5.10 | 5.67 |
| | SD | 2.88 | 2.63 | .32 | 2.57 |
| Female | M | 6.90 | 5.80 | 5.50 | 6.07 |
| | SD | 2.23 | 2.62 | 2.76 | 2.15 |
| Overall | M | 6.20 | 6.10 | 5.30 | |
| | SD | 2.61 | 2.57 | 1.92 | |
| Office 2 | | | | | |
| Male | M | 8.40 | 5.00 | 1.40 | 4.97 |
| | SD | 1.67 | 2.92 | .89 | 3.49 |
| Female | M | 8.00 | 4.60 | 9.00 | 7.20 |
| | SD | 2.92 | 3.36 | 2.24 | 3.74 |
| Overall | M | 8.20 | 4.80 | 5.20 | |
| | SD | 2.25 | 2.97 | 4.32 | |
| Office 3 | | | | | |
| Male | M | 5.50 | 4.00 | 6.80 | 5.44 |
| | SD | 2.55 | 2.63 | 2.39 | 2.45 |
| Female | M | 5.30 | 6.10 | 5.40 | 5.60 |
| | SD | 3.13 | 2.38 | 2.41 | 2.52 |
| Overall | M | 5.40 | 5.05 | 6.10 | |
| | SD | 2.78 | 2.67 | 2.45 | |

# APPENDIX E

# FOLLOW-UP DATA

Raw Data: Follow-up Measures

| Subject | | Pulse | Arousal | Symptoms | Fear | Drug |
|---|---|---|---|---|---|---|
| | | **Drug-informed** | | | | |
| 1 | | | | | | |
| | Visit 1 | 84. | 2. | 13. | 1. | 1. |
| | Visit 2 | 72 | 3 | 14 | 1 | 2 |
| 2 | | | | | | |
| | 1 | 60 | 5 | 18 | 7 | 4 |
| | 2 | 76 | 4 | 13 | 2 | 4 |
| 3 | | | | | | |
| | 1 | 72 | 6 | 16 | 9 | 10 |
| | 2 | 83 | 2 | 8 | 7 | 1 |
| 4 | | | | | | |
| | 1 | 64 | 2 | 8 | 1 | 1 |
| | 2 | 60 | 2 | 7 | 4 | 1 |
| 5 | | | | | | |
| | 1 | 72 | 6 | 18 | 4 | 2 |
| | 2 | 76 | 5 | 13 | 4 | 3 |
| | Mean 1 | 70.4 | 4.2 | 14.6 | 4.4 | 3.6 |
| | Mean 2 | 74.4 | 3.2 | 11.0 | 3.6 | 2.2 |
| | | **Normality** | | | | |
| 1 | | | | | | |
| | 1 | 80 | 3 | 20 | 9 | 1 |
| | 2 | 72 | 1 | 8 | 1 | 1 |
| 2 | | | | | | |
| | | 52 | 5 | 19 | 8 | 1 |
| | | 60 | 8 | 29 | 10 | 1 |
| 3 | | | | | | |
| | | 60 | 9 | 42 | 8 | 1 |
| | | 60 | 8 | 35 | 8 | 1 |
| 4 | | | | | | |
| | | 60 | 6 | 20 | 5 | 1 |
| | | 56 | 7 | 25 | 17 | 1 |
| | 1 | 63.0 | 5.75 | 25.25 | 7.5 | 1.0 |
| | 2 | 62.0 | 6.00 | 24.25 | 6.5 | 1.0 |

Raw Data (Continued)

| Subject | | Pulse | Arousal | Symptoms | Fear | Drug |
|---|---|---|---|---|---|---|
| | | Control | | | | |
| 1 | | | | | | |
| | Visit 1 | 68. | 1. | 6. | 2. | 1. |
| | Visit 2 | 68 | 2 | 6 | 1 | 1 |
| 2 | | | | | | |
| | 1 | 80 | 5 | 14 | 1 | 1 |
| | 2 | 68 | 3 | 9 | 3 | 1 |
| 3 | | | | | | |
| | 1 | 88 | 6 | 12 | 6 | 1 |
| | 2 | 92 | 5 | 13 | 4 | 1 |
| 4 | | | | | | |
| | 1 | 83 | 7 | 32 | 7 | 1 |
| | 2 | 60 | 5 | 26 | 6 | 1 |
| 5 | | | | | | |
| | 1 | 70 | 6 | 31 | 9 | 1 |
| | 2 | 68 | 5 | 21 | 5 | 1 |
| | Mean 1 | 77.8 | 5.0 | 19.0 | 5.0 | 1.0 |
| | Mean 2 | 71.2 | 4.0 | 15.0 | 3.8 | 1.0 |

# APPENDIX F

# PILOT STUDY

An initial concern existed in the planning stages of this study with regard to possible extraneous variables which might be in operation along with the experimental manipulation provided to the subjects, thereby affecting and confounding the results. The variables which were considered to be possible problems included the reassurance provided to subjects by the experimenter's presence or information (which would not be present in the control group), and the possible increased feeling of normality which might be induced by the experimenter in the experimental condition, through the discussion with the patient regarding typical symptoms of the dental experience. More specifically, the study needed to control these two variables to guarantee that data obtained in the Drug-informed group would not be a result of a differential level of normality or reassurance brought on by the experimenter or the information provided, rather than the direct result of the content of the information provided to the subjects.

An initial step was to bring the Normality condition into the paradigm. This condition, it was hoped, would conceivably tease out the effects of normality and/or reassurance from the experimental effect predicted in the Drug-informed condition. A check on this assumption was done through a pilot study, using subjects in a role-playing situation.

Twenty-two Introductory Psychology students were asked to imagine themselves in the dental chair about to have a filling done, having just received an injection of novocaine. Eight of these subjects were then provided with the information for the Drug-informed group (written), seven were given the Normality group information, and the

remaining seven subjects were provided with no information (Control). They were then all asked to indicate on a 10-point scale, based on their role playing, how aroused they would feel in such a situation, how normal they would feel their reaction to be, and how reassured they would feel.

Arousal levels of the Drug-informed, Normality, and Control groups did not differ significantly (M's = 5.50, 4.86, and 4.14, respectively). The results suggested that both the Drug-informed and the Normality groups felt significantly more normal than the Control subjects and these two groups were not significantly different from each other (M's = 8.0, 8.14, 6.43, respectively). It was apparent from this data that the use of a Normality group as a comparison measure for the Drug-informed condition was an appropriate addition to the study.

The Normality group reported significantly more reassurance than did either the Drug-informed or Control groups (M's = 6.17, 4.25, and 2.14, respectively), and the Drug-informed group was significantly higher than the Control also.

It was hoped that this pilot work could add insight into what exactly was being tapped in the three experimental conditions. The actual study data, however, found no significant differences on either of these two variables or on a third factor, level of self-focus, between any of the conditions (see Tables 7, 8, and 9). The lack of correspondence between the data from the role-playing situation and that from the actual study can probably be explained simply as a result of the artificiality of the role-playing exercise in this situation. Indeed, both dentists and assistants in the actual dental offices provided verbal reinforcement and reassurance to their patients, such that

even the control group received some support. Therefore, the experimenter did not apparently stand out as an exclusive source of reassurance for the two experimental groups, nor did the Control group entirely lack contact with potentially reassuring sources.

It should be noted that the level of reassurance felt in the Drug-informed condition of Office 2 was marginally significant ($p$ =.057) compared to the Normality group, with the level of the former being the higher of the two. In this condition of Office 2, attributions to the drug, attributions to fear, and level of present arousal also stood out as the highest of the offices. A strong correlation was also noted between reassurance and attributions to the drug ($r$ = .39, $p$ = .03). Therefore, it appears that the high level of reassurance reported in this condition was an artifact due to the elevation of the other factors and the small number of subjects in the group.

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